MERCURY CONTROLS FOR NON-ELECTRIC GENERATING UNITS

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TAB A: INTRODUCTION

Background

On March 15, 2005, EPA revised and reversed its December 2000 finding that it was appropriate and necessary to regulate power plants under section 112 of the Clean Air Act (CAA) and issued the Clean Air Mercury Rule (CAMR). CAMR limits mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program that will reduce nationwide utility emissions of mercury in two distinct phases. The first phase cap is 38 tons and emissions will be reduced primarily by taking advantage of "co-benefit" reductions achieved by reducing sulfur dioxide (SO2) and nitrogen oxides (NOx) emissions under the Clean Air Interstate Rule (CAIR). By 2018, coal-fired power plants will be subject to a second cap, which will reduce emissions to 15 tons upon full implementation. Virginia's portion of the nationwide mercury budget Under CAMR is 0.592 tons in Phase 1 and 0.234 tons in Phase 2.

Virginia State Air Pollution Control Board

In early August of 2005, the Virginia State Air Pollution Control Board (SAPCB) held a public hearing to prepare for the adoption of the Clean Air Mercury Rule. At that time it was the Virginia Attorney General's opinion that Virginia code permitted the trading of criteria pollutants but did not authorize the trading of hazardous air pollutants. This would have caused issues with adopting the Federal rule as proposed. Later that month the Virginia Department of Environmental Quality convened the first meeting of the ad hoc advisory group to assist the State in developing a Virginia specific Clean Air Mercury Rule (CAMR). This advisory group met 6 times over a one and a half month period. The advisory group proceeded with the understanding that any draft rule would not provide for trading of mercury. After taking into consideration the information generated by the advisory group, the Department briefed the SAPCB in December of 2005. At that meeting, the Department proposed a draft rule that prohibited trading and sought reductions of mercury totaling approximately 65 percent from both Electric Generating Units (EGU's) and Non Electric Generating Units (Non-EGU's). After public comment and some discussion by SAPCB members, it was determined that further analysis was needed of a STAPPA/ALAPCO model rule (seeking reductions upwards of 90 percent) and that both the DEQ Draft rule and a refined STAPPA/ALAPCO rule should be considered before making any final decision.

The SAPCB reconvened in January 2006 to receive a presentation on the two proposed rules. On the issue of mercury trading the Department advised the Board that while trading was not contemplated in either of the proposals, legislation was being considered by the General Assembly (that will allow trading) and that seeking comment on trading at this time would be beneficial if trading were authorized.

After reviewing both proposals, The State Air Pollution Control Board requested the following information:

- Information on the relative risks of mercury
- Comment on the co-benefit of the proposals

- Suggestions for alternative approaches, including the extent to which the proposals could be blended or melded into another approach or a hybrid.
- More information on emerging technologies to control mercury emissions, and other technologies that are currently available that might be cheaper.
- Cost benefit analysis, including the social benefits of controlled mercury, impact on human health and the environment, and the co-benefits of controlled mercury.
- Cost of installing the equipment and operating the equipment, including all the assumptions of the costs where costs information is provided: including what the equipment is and what it costs, amortization and appreciation assumptions, what capital costs have been assumed and what assumptions have been on other equipment.
- Information on the benefits and costs of doing an approach and not doing an approach.
- Information comparing and contrasting the approaches.
- Input on risks as well. What is current risk to population and how will risk be reduced as a result of the approaches?
- Suggestions of an appropriate percentage reduction for that approach and why the percentage is recommended.

Senate Bill 242 and House Bills 1055 and 1471

While the SAPCB was in the process of developing a Virginia specific Mercury rule, several bills were making their way through the General Assembly. One bill, HB 1471 prohibited the State Air Pollution Control Board from imposing mercury emission controls that were more stringent than the federal Clean Air Mercury Rule or would be imposed earlier than necessary for Virginia to comply with the federal Rule. The bill also prohibited the Board from adopting any regulation or agreement that might restrict a facility's participation in the national mercury trading program. Two additional bills, proposed as Clean Smokestacks legislation (SB242 and HB1055), sought reductions in NOx and SO2 as well as mercury. In the original text of these bills, mercury reductions of 90 percent were sought from electric generating units by May 1, 2009. The bills also required DEQ to implement a strategy to achieve reductions in mercury emissions from non-electric generating units by July 1, 2008.

After much discussion the General Assembly decided to incorporate the goals of HB1471 into the Clean Smokestacks (HB 1055) legislation. The final text was passed by the General Assembly stating that the State Air Pollution Control Board shall adopt and submit to the EPA the model Clean Air Mercury Rule (CAMR) promulgated by the EPA, including full participation by Virginia EGU's in the EPA's national mercury trading program. This would allow the state to implement a narrowly focused trading program allowing in state credits to be traded but not utilized for in state reductions (compliance). The legislation also required a mercury study be conducted by the Department of Environmental Quality. The following language covers the study and is from the amended Code of Virginia:

§ 10.1-1328 That the Department of Environmental Quality shall conduct a detailed assessment of mercury deposition in Virginia in order to determine whether particular circumstances exist that justify, from a health and cost and benefit perspective, requiring additional steps to be taken to control mercury emissions within Virginia. The assessment shall also include (i) an evaluation

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of the state of mercury control technology for coal-fired boilers, including the technical and economic feasibility of such technology and (ii) an assessment of the mercury reductions and benefits expected to be achieved by the implementation of the CAIR and CAMR regulations. The Department shall complete its preliminary assessment as soon as practicable, but not later than October 15, 2007, and shall report the final findings and recommendations made as a result of the assessment to the Chairmen of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources as soon as practicable, but no later than October 15, 2008.

State Advisory Board on Air Pollution

It is under *§ 10.1-1328*, that Virginia DEQ has asked the State Advisory Board on Air Pollution to study mercury controls for Non-EGU's. The purpose of this report is to advise the Department and the State Air Pollution Control Board on our findings on control technologies, costs of those technologies and the feasibility of any recommended controls for achieving mercury reductions.

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TAB B: HEALTH / ENVIRONMENTAL IMPACT

Concerns about the potential impact of mercury (Hg) on public health and the environment have led to increased pressure to adopt new regulations and identify potential methods of controlling industrial emissions of mercury.

Mercury is a toxic heavy metal that persists in the environment once it is released into the atmosphere.[1] Concern about high levels of mercury deposition and subsequent bioaccumulation in aquatic ecosystems - a phenomenon that can pose serious health risks for humans and animals that eat mercury contaminated fish - has emerged as an important public health and environmental issue in recent years.[2]

Mercury moves through the environment as a result of both natural and human (anthropogenic) activities.[3] The human activities that are chiefly responsible for causing mercury to enter the environment are burning fuels and wastes containing mercury, and industrial manufacturing processes.[4]

Once mercury enters waters, either directly or through air deposition, it can bioaccumulate in fish and animal tissue as methylmercury, its most toxic form.[5] Bioaccumulation means that the concentration of mercury in predators at the top of the food chain can be thousands or even millions of times greater than the concentrations of mercury found in the water.[6] Exposure to high levels of mercury has been associated with serious neurological and developmental effects in humans.[7]

The concerns about health effects of mercury arise because mercury is a neurotoxin that in certain forms can cause abnormal brain development in fetuses and mental retardation and learning disabilities in children.[8] EPA estimates that one to three percent of American women of childbearing age eat enough mercury-containing fish to be at risk.[9] However other studies suggest that eight percent of such women may have mercury levels that could harm a fetus.[10]

Fish tissue studies have prompted consumption advisories and restrictions for certain species caught in segments of Virginia's and other states' waterways.[11]

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[1] Environmental Regulation and Technology Innovation; Controlling Mercury Emissions from Coal fired boilers, September 2000.

[2] Id.

[3] Id.

[4] Id.

[5] Id.

[6] Id.

[7] Id.

[8] Coal Combustion Technologies, Virginia DEQ, State Advisory Report, 2004.

[9] Cited in "POWERful Facts About Mercury in North Carolina," Center for Energy and Economic Development (undated, no other publication information, distributed at the NC Division of Air Quality, *Mercury and Carbon Dioxide Workshop,* Raleigh, NC, April 19-21, 2004.

[10] Cited in "Who'll Stop the Mercury Rain?" U.S. News & World Report, April 5, 2004

[11] Virginia mercury-related fish consumption restrictions and advisories are in place for Lake Gordonsville (also known as Bowlers Mill Lake); Lake Trashmore; Lake Whitehurst; and segments of the Pamunkey River; the Mattaponi River; Herring Creek; the North Fork of the Holston River; the South, South Fork Shenandoah, and Shenandoah Rivers; Blackwater River; Great Dismal Swamp Canal; and Dragon Run Swamp. The latter three are "blackwater" areas and their mercury contamination has not so far been associated with any obvious surface sources. *Richmond*

Also, the Food and Drug Administration and EPA have issued advice on consumption of marine fish due to mercury.[12]

Accordingly, this report is focused on Non-EGU Mercury Controls, which if feasible and utilized, would be protective of human health and the environment.

Time –Dispatch, October 1, 2004 and Alex Barron (Virginia DEQ) and materials distributed at the Virginia DEQ water program Mercury Advisory Committee meeting held April 16, 2004.

[12] Coal Combustion Technologies, Virginia DEQ, State Advisory Report, 2004.

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TAB C Non-EGU Hg OTHER STATE REGULATIONS

This review of other state regulations to control mercury from non-EGU sources is not intended to be exhaustive. Rather, an attempt has been made to present the breadth and scope of existing and planned state regulatory initiatives that are present. Reviewed regulations and regulatory initiatives fall into two categories: those that directly limit emissions from non-EGU sources, and those that aim to limit mercury pollution through control or prohibition of mercury use in consumer and commercial products, vehicle components, and in the medical and dental industry. The latter group is included in this review because they generally address the reduction of mercury sources that could other wise ultimately contribute to mercury air emissions. The very large number of water and solid/hazardous waste (especially) regulations that exist are not covered.

1) General Information on State Mercury Control Programs

While mercury pollution is generally known to be a long range problem[13], most if not all states are involved in some level of activity regarding mercury pollution. Much of the recent activity is credited to the increased visibility of the issue, due to increased public awareness of mercury toxicity. In 2001, a coalition of state governmental environmental association leaders formed the Quicksilver Caucus (QSC) to collaboratively develop holistic approaches for reducing mercury in the environment. Members of the caucus include the Environmental Council of the States (ECOS), the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), the Association of State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA), the Association of State Drinking Water Administrators (ASDWA), and the National Pollution Prevention Roundtable (NPPR). In October of last year, the QSC, in conjunction with the National Wildlife Federation, created the 2005 Compendium of States' Mercury Activities, updating the first compendium published in 2001 by ECOS. According to the compendium, the document is a roadmap to assist individuals, policymakers, businesses, and communities in developing, implementing and strengthening mercury reduction efforts. It is an excellent starting point for understanding how the various states are addressing mercury pollution prevention and control.

The information in the compendium is based on a state survey that was completed by the caucus members in April 2005. Forty-five of the fifty states responded to the survey. The survey identified a wide range of mercury reduction actions and a growing trend toward states developing comprehensive overall mercury action plans. Sixteen states have an existing overall mercury action plan or strategy document and 6 more, totaling almost half of the respondents,

[13] The EPA, in its July 5, 2006 *Roadmap for Mercury* report, estimates that 83% of the mercury deposition in the United States comes from international sources, with the remaining 17% coming from U.S. and Canadian sources. At the national and regional levels, shorter range modeling indicates that domestic mercury emission sources mostly contribute to the eastern deposition (and global sources are the most significant contributors to western deposition).

are currently developing one. The most common elements of these strategies are mercury recycling, public outreach and education efforts, small business, household, and dental/medical mercury waste management, and reduction of mercury in consumer and commercial products such as mercury switches and thermostats.

As is the case in Virginia, over 50% of the surveyed states reported that coal-fired electric power plants are their largest source of mercury emissions, and 10 of those states reported having their own regulations controlling those sources. Most current state mercury emission limitation rule-making initiatives are also focused on EGU's. In the top three sources of non-EGU mercury emissions that were reported by states were industrial boilers (in the top three sources in 12 states), cement kilns (in 11 states), mining (10), and municipal solid waste incinerators (9). While there are relatively few states with air regulations that limit mercury emissions from non-EGU sources (beyond those adopting federal standards), regulations governing some aspect of mercury use and disposition have either already been adopted or are proposed in most states.

2) State Regulations Limiting Emissions from Non-EGU Sources

It is apparent from the QSC Compendium and from the regulations in different states, that states usually choose to develop regulations that address mercury emissions from the most significant specific source categories that are within their boundaries. Some states may control mercury from wastewater sludge incinerators, others from municipal solid waste incinerators. Often, it is one or the other. Regulations that control emissions from stationary sources in general are few.

The state of New Jersey seems to have most comprehensive mercury emission control regulations. In December 2004, The New Jersey Department of Environmental Protection (NJDEP) promulgated a regulation for the *Control and Prohibition of Mercury Emissions*. The regulation specifies numeric mercury emission limitations and compliance dates for 1) any municipal solid waste incinerator, including those located at apartment buildings or commercial facilities, regardless of size; 2) any hospital/medical/infectious waste (HMIW) incinerator (except co-fired combustors burning a fuel feed stream of less than 10% HMIW); 3) any iron or steel smelter; and 4) any coal-fired boiler, regardless of size. The established mercury emission level for coal-fired boilers of 3.00 mg/MW-hr is an option to achieving mercury emission reductions of 90%. The provision to limit emissions from non-EGU coal-fired boilers addresses the top non-EGU industrial boiler source category. The New Jersey DEP's regulation on iron and steel smelters also allows for either a mercury emission limitation of 35.0 milligrams of mercury per ton of iron or steel production, or for a 75% reduction in mercury control efficiency. Compliance must be achieved by 2007 for boilers and 2010 for smelters.

While New Jersey is the only state identified in this review that has regulations directly controlling mercury emissions from coal-fired boilers, the Wisconsin Department of Natural Resources promulgated an amendment to their regulation on *Control of Mercury Emissions* in 2004 that applies to all air contaminant sources that may emit mercury. The regulation requires a

permit to commence construction or modification on any stationary source that results in an increase of annual allowable mercury emissions of 10 lbs or more of mercury without a permit. Permitted emissions must be controlled to BACT. There is nothing that requires retrofitting existing sources with controls. The Wisconsin regulation also sets numeric mercury emission limitations for Chlor-alkali plants or mercury ore processing facilities, and wastewater treatment sludge incineration and drying plants, although the emission limitations for those are set at curiously high levels of 2300 grams per day and 3200 grams per day respectively. (These equate to 5 and 7 pounds per day or 1850 and 2573 pounds per year - five time the level of any facility reporting mercury emissions in Virginia.)

A number of other states regulate emissions from Municipal Waste Incinerators/Combustors. The Connecticut Department of Environmental Protection regulates mercury emissions from municipal waste combustors to 0.080 mg/dscm or 0.028 mg/dscm (depending on the date of construction, reconstruction, or modification), or to an 85% control efficiency. These are typical emission levels and optional control efficiency requirements, and they are used similarly by the Department of Health and Environmental control in South Carolina, the Pollution Control Agency in Minnesota, the Florida Department of Environmental Protection and by New Jersey, although the NJ DEP regulations continue to ratchet down the control requirements from 80% to 95% by 2012.

Many states have Air Toxic regulations similar to those in Virginia for control of emissions of Hazardous Air Pollutants, including mercury, that prevent emissions from reaching significant ambient air concentrations beyond a facility fenceline. While these regulations only indirectly limit mercury emissions, the Connecticut Department of Environmental Protection regulations actually sets maximum allowable stack emissions based on a "hazard limiting value" (HLV) used in a formula containing stack height. The HLV is set at 1 ug/m^3 for an 8-hour standard and at 5 ug/m^3 for a 30-minute standard.

The North Carolina Department of Environment and Natural Resources has a regulation for *Control of Mercury Emissions* (effective June 1985 and amended July 1996) which limits mercury emissions to 2300 grams per day from all new and existing stationary sources engaged in the handling or processing of elemental mercury. The state of Florida, which has a mercury recycling facility, requires total containment of the operation.

State Regulations Addressing Mercury Pollution through Source Reduction and Product Control or Use Prohibitions

In comparison to the relatively few state regulations directly limiting releases of mercury from non-EGU sources, more than half of the states have one or more regulations addressing mercury pollution through control or prohibition of mercury use in commercial products, vehicle components, and in the medical and dental sector.

Twenty-two states have either existing laws/regulations or active bills in their legislature controlling the mercury in consumer and commercial products. California, Illinois, Indiana,

Massachusetts, Montana, Nebraska, and New Jersey all have outright bans on the sale of mercury thermometers, or require their phase-out. Some of these prohibitions include mercury thermostats, manometers, and switches. Arkansas has a prohibition on the use of outdoor mercury vapor lamps. The following 8 states have enacted legislation that requires labeling of certain mercury containing products in order to promote responsible disposal: Connecticut, Maine, Maryland, Minnesota, New York, Rhode Island, Vermont, and Washington.

One of the top significant sources of mercury in Virginia is electric arc furnaces, which are used to recycle scrap metal from End-of-Life (ELF) Vehicles. Mercury emissions result from the recycling process when mercury-containing vehicle components are left in the vehicles. According to the QSC Compendium, 21 states have some kind of proposed or enacted vehicle mercury switch legislation or regulation. State programs for mercury switch removal from ELF vehicles is still mostly voluntary, but six of those states, Arizona, Arkansas, California, Maine, Minnesota, and Oregon, currently require mandatory removal of mercury switches and/or headlamps from vehicles prior to shredding for recycling. The responsibility for removal varies between the owner, the recycler, and the manufacturer. Eleven states offer financial incentives for the component removal. Massachusetts requires vehicle manufacturers to set up mercury switch removal programs. Further, Arkansas, California, Connecticut, and Maine currently have bans on the actual sale of motor vehicles with mercury components, with California prohibiting the sale of vehicles manufactured after January 1, 2005, and Connecticut, the sale of vehicles manufactured after January 1, 2007. Maine has prohibited the sale of any vehicles with mercury components since 2003, with provisions for a waiver of the rule under certain circumstances.

The medical and dental fields have also been identified as significant sources of mercury pollution. The EPA has determined that the medical/dental sector represents the fourth highest source of mercury air emissions because of their contribution to HMIW incinerators. Control of mercury from the medical source is, for the most part, covered by regulations governing HMIW incinerators or regulations governing the use of mercury in products, which have been previously discussed. The dental portion of this source category may represent an unusually large emission source. The EPA has identified 12 states that have either existing laws and regulations or active legislative initiatives regarding control of mercury from the dental business. Most of the initiatives address the recycling of mercury from mercury amalgams to keep mercury out of the solid and liquid waste streams, but there is a growing awareness for the potential for significant mercury emissions from cremations where mercury amalgams have not been removed. Colorado and Illinois currently have prohibitions on the use of mercury amalgams in certain populations, typically pregnant women and children, and many states have passed laws that require that dental patients are counseled on the toxicity of mercury. California has a law in place that requires that insurance companies cover mercury amalgam alternatives. Interestingly, in 2005 both Maine and Minnesota introduced legislation to require removal of mercury amalgams prior to cremation. The language in the Minnesota bill read: "If, after accepting delivery of a body for cremation, it is discovered that the body contains dental mercury, the mercury or amalgam must be removed from the body by a licensed mortician or dentist before cremation." Both bills were defeated.

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Sources of Information:

EPA Mercury page on State Legislation and Regulations at
http://www.epa.gov/epaoswer/hazwaste/mercury/laws.htm#

Quicksilver Caucus 2005 Compendium of States Mercury Activities at
http://www.ecos.org/files/1952_file_Full_Compendium_Final_03312006.pdf

The Public Laws of Maine at
http://janus.state.me.us/legis/ros/lom/LOM120th/5Pub651-700/Pub651-700-05.htm

Regulations of the Florida Department of Environmental Protection at
http://www.dep.state.fl.us/Air/rules/current.htm

Regulations of the Connecticut Department of Environmental Protections at
http://dep.state.ct.us/air2/regs/mainregs/sec29.pdf

Minnesota Strategies to Reduce Mercury Emissions at
http://www.pca.state.mn.us/publications/reports/lrp-mercury05-appc.pdf

The Regulations of the New Jersey Department of Environmental Protection at
http://www.state.nj.us/dep/aqm/rules.html

The Regulations of the Wisconsin Department of Natural Resources at
http://dnr.wi.gov/org/aw/air/reg/nr400toc.htm

The Regulations of the Department of Health and Environmental control in South Carolina at
http://www.scdhec.net/eqc/baq/regs/index.html

The Regulations of the North Carolina Department of Environment and Natural Resources at
http://daq.state.nc.us/rules/rules/D0537.pdf

Maryland Report on Mercury and Products that Contain Mercury at
http://www.mde.state.md.us/assets/document/Mercury%20Report%202004%20-%20FINAL.pdf

Minnesota Waste Management Act: Mercury laws as
amended through the 2001 Legislative session at
http://www.moea.state.mn.us/berc/WMA-hg-01.pdf

The 84th Legislative Session of the Minnesota House of Representatives at
http://www.revisor.leg.state.mn.us/bin/bldbill.php?bill=H0661.0&session=ls84

A presentation on Mercury Emissions from Cremetoria by the Wisconsin Great Lakes Binational Toxic Strategy at
http://www.epa.gov/docs/grtlakes/bns/reports/stakesdec2005/mercury/Reindl.pdf

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Tab D: ANALYSIS OF MAJOR NON-EGU SOURCE EMISSIONS

EPA's TRI Report of Mercury Emissions in Virginia

The 2003/2004 TRI lists of sources of mercury emissions to the air in Virginia was reviewed. This list is shown as Figure 1. In the most recent year shown (2004), the largest reported source category of mercury emissions in Virginia came from Electric Generating Units (EGU's), which represents 58% of Virginia's emissions. Electric generating facility mercury emissions will be significantly reduced in Virginia due to the requirements of the federal Clean Air Mercury Rule (CAMR) and the requirements of HB 1055 passed by the General Assembly.

After the EGU category, the non-EGU source categories were reviewed for their mercury emissions contributions. One iron/steel smelter plant had the second highest mercury emissions, reporting 16% of Virginia's total mercury emissions in 2004. A second iron/steel smelter reported no mercury emissions. DEQ is aware of this discrepancy and is investigating the reason for this difference with the company reporting no mercury emissions. One coke oven plant had the third highest mercury emissions, reporting 16% of Virginia's mercury emissions in 2004. The mercury emissions dropped off significantly after the top three source categories described above. The next source of mercury emissions was the 5 Kraft Paper mills, reporting a total of 7% of Virginia's emissions. These source categories described above (EGU's and non-EGU's) represent 97% of mercury air emissions reported in Virginia. Each of these non-EGU source categories described above will be further addressed in this report. These source categories will be reviewed for 1) a breakdown of mercury emissions within the source category, 2) mercury control technology/pollution prevention options, 3) technical feasibility and costs of mercury controls. Incinerators used to be a large source of mercury emissions, but due to recently implemented regulations and the resultant MACT requirements, controls have made these emissions insignificant.

Further down the list of mercury emissions includes other source categories in the state such as a refinery, chemical plant, tobacco manufacturing plant, cement plant, and pipe/foundry plants. These sources together do not account for a significant portion of mercury emissions in Virginia (only about 3% of Virginia's mercury emissions), and therefore were not addressed in this report.

It is important to note the EPA's TRI report of mercury emissions in Virginia does not include all mercury emitters in the state. Only certain source categories are required to report to EPA. Therefore, the percentages of mercury emissions shown by source categories in this report would change given all the true emitters of mercury in the state. Additionally, this report is addressing several other source categories of known mercury emitters (although not TRI reportable) such as incinerators and crematoriums, to determine impact on overall mercury emissions in the state.

It is also important to note that the majority of the TRI data for mercury emissions is based on emission factors, and not site specific stack testing. Mercury emissions vary from plant to plant, and between coal suppliers, and therefore actual mercury emissions may be different from industry standard emission factors as reported below.

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Figure I
Virginia Companies Reporting TRI Mercury Emissions in 2003 and 2004 (Air only)

Company Name	For EGUs- total MW capacity for facility	2003 Hg Emissions (lbs)	2004 Hg Emissions (lbs.)
Dominion – Chesterfield	1254.3	370	320
Jewell Coal & Coke		342	343
Chaparral Steel		310	360
Dominion – Bremo	248.7	170	160
AEP – Clinch River	600	148	139
Chesapeake Energy	381.8	140	160
Dominion – Yorktown	327.8	110	130
Potomac River Generating Station	459.3	70.6	62
Cogentrix of Richmond	285.7	64.8	72
Stone Container (Hopewell)		63.4	7.8
AEP – Glen Lyn	303.2	63	48
Meadwestvaco		55.5	28
Hopewell Cogen	114.3	53.4	21.04
International Paper		43.4	46.7
Commonwealth Chesapeake Power		43.3	29.2
Stone Container (West Point)		42.8	50.7
James River Cogen		28.7	32.7
Cogentrix Virginia	114.3	27.4	29.2
Georgia-Pacific (Big Island)		26.5	23
Gordonsville Power Station	300	22	0
Cinergy Solutions of Narrows		21.7	26.3
Dominion – Clover	778.1	17	18
Yorktown Refinery		14.8	14
Phillip Morris		10.4	9.8
Celanese Acetate – Celco		10.2	0
Global Stone (Shenandoah) Quarry		7.95-land	2.3?
Solite/Giant Resource		7.33	NR
Roanoke Cement		5.9	6.4
Invista		1.9	2
Mecklenburg Cogen	158.9	1.51	1.79
Dominion – Altavista	72.8	1	0
Intermet – Archer Creek		1	1
Southampton Power Station	76.2	1	3
Griffin Pipe		0.74	0.3
Intermet New River Foundry		0.42	NR
Global Stone Chemstone (Winchester)		0.4	.45
Global Stone (Shenandoah) Lime Plant		0.4	2.3
Intermet Radford Foundry		0.14	NR
Meadwestvaco (Carbon Plant)		0.11	NR
Birchwood Power	219	0.1	4
Roanoke Electric Steel		0	0

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TAB D-1(a): Analysis and Control of Mercury Emissions from Iron/Steel Melters

This source category represents 2 plants, with one plant reporting 16% of all mercury emissions in Virginia. There are two operating steel and scrap recyclers in the Commonwealth and both are expected to have rather high mercury emissions. According to TRI data, Chaparral Steel reported 360 pounds of mercury emissions in 2004 while a second, Roanoke Electric Steel, reported zero emissions. As mentioned previously, the majority of the TRI data for mercury emissions is based on emission factors, and not site specific stack testing.

Sources of Mercury in Virginia

According to the Clean Car Campaign, it is estimated that switches in vehicles retired in Virginia in the year 2003 totaled 230,892 representing some 509 pounds of mercury emissions. From 1973-2003 it is estimated that 7,085 total pound of mercury emissions have resulted from current steel and scrap recycling practices. These are estimates only and may be on the low end if we are to consider current TRI data and the current steel and scrap recyclers operating in Virginia.

Background:

Electric arc furnaces (EAFs) use electric energy to melt and refine scrap in a batch process to make steel products. Scrap metal feedstock is derived from End of Life Vehicles (ELVs). Particulates and gases that evolve during the steel-making process are conveyed into either a wet or dry gas cleaning system. Particulate matter removed from the gas cleaning system is a listed hazardous waste, K061. Mercury is one of the constituents of EAF dust. 10-20 kg of EAF dust may be generated per metric ton of steel produced, and 500,000 metric tons of EAF dusts are generated annually in USA.

Mercury emission estimates submitted by 19 EAFs to EPA in 2001 range from 0.005 to 54 kg/yr, with emissions from 18 facilities less than 1 kg per year. There are two plants in Virginia. The 2001 annual estimates of mercury emissions were 0.60 metric tons/year as compared to a US total of 19.3 tons/year. The 2002 estimates of Hg emissions nationally by EPA were 10 tons per year, while the 2005 estimates were at 10.7 tons per year.

The use of mercury in switching devices in automobiles and some appliances should offer significant evidence that steel recycling and scrap metal processing facilities are potential high sources of mercury emissions. While mercury switches have been phased out of automobiles (Europe: 1993 and United States: 2002), many vehicles containing mercury are still in use. As well, new applications of mercury are currently being introduced in both foreign and domestic cars alike. High Intensity Discharge (HID) headlamps and background lighting in automotive displays are two examples of this new application. Mercury switches can also still be found in many appliances that end up at recycling facilities. It is for this reason that these facilities will continue to emit large amounts of mercury for decades to come or so long as the useful life of these vehicles and appliances.

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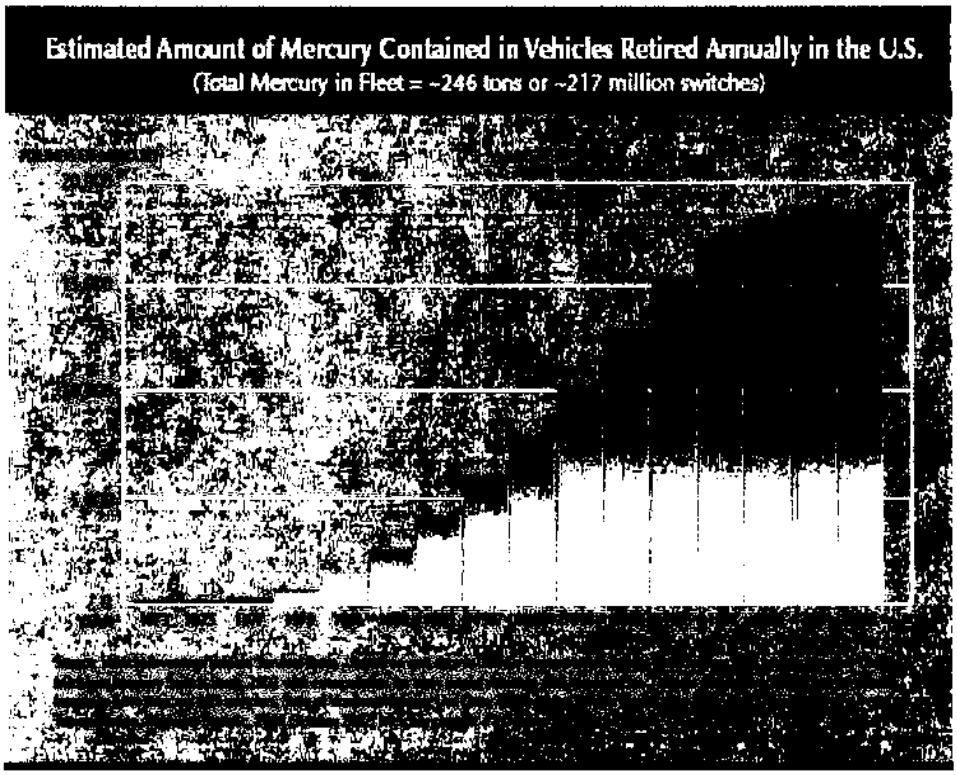
It is estimated that over 54,000 pounds of mercury from auto switches has been released to the environment from January 2001 through April 2004.[14] As evident in the graph below[15], mercury emissions from vehicle recycling have somewhat leveled out over the last 8 years. Unfortunately, this plateau represents the highest levels seen in US history and is expected to remain that way for several years and then slowly decline over the next couple of decades or until such time as these vehicles have been completely phased out of the US fleet.



Strategies and Policies for Cleaner End-of-Life Vehicles (ELVs):

There are two basic strategies for reducing the releases of mercury and other toxic substances from ELVs. Prevent future releases by eliminating uses of mercury in vehicles, and reduce current releases by removing, collecting, and recovering mercury from mercury containing parts. Neither of these strategies faces technological hurdles or significant cost barriers.

More than 99 percent of the automotive use of mercury is reported to be in switches, either for convenience lighting or anti-lock braking systems. For mercury containing parts in the existing vehicle fleet, the best option is to remove the parts before cars are shredded and the metals sent to melters or furnaces where mercury easily vaporizes.

[14]Clean Car Campaign website: Environmental Impacts of Cars- Mercury In Vehicles Update http://www.cleancarcampaign.org/Mercury_April_2004.pdf

[15] Id.

Steel mini-mills are not regulated for mercury emissions at the federal level, and typically do not employ mercury emissions controls.

Mercury in Appliances

Mercury switches are used in a variety of appliances and household items such as washing machines, freezers and space heaters. In clothes washers, they usually assist in the turning on of a light or stopping the spin cycle. Freezers and heaters use mercury switches in their thermostats to determine when a desired temperature has been reached. Other items that use mercury are fluorescent lamps, batteries, clothes irons, sump pumps, and blenders. Appliance manufacturers have been phasing out the use of mercury and according to a spokesperson for the National Association of Home Appliance Manufacturers, all household appliances manufactured after January 1, 2001 have not contained any mercury.[16] This has been a voluntary effort by the manufacturers who are offering mechanical switches as alternatives to the mercury switches. The one exception to this effort is some models of gas stoves.

Mercury switches in appliances are much more difficult to access in appliances and involve greater amounts of labor and resources to remove. Most states addressing mercury switches have chosen to avoid removal from appliances due to their accessibility issues and the fact that they make up a much smaller amount of mercury than that found in automobiles.

States and localities known to address mercury in appliances include: Minnesota, Wisconsin and Illinois in EPA Region 5 (Great Lakes Region) have identified mercury devices in appliances and have worked with the appliance repair industry and end-facilities to eliminate the mercury components of appliances prior to disposal. In Minnesota, mercury in repaired or replaced items must be reused or recycled. Illinois, Indiana, and Wisconsin have also targeted the removal of mercury devices in appliances. A report from the Virtual Elimination Pilot Project supports these findings stating that the disposal of mercury from appliances is regulated by law in the states of Minnesota and Illinois. California also has a mandated requirement to remove mercury switches from appliances. Several localities in the northeast have voluntary removal programs at their transfer stations.
In Vermont removal of mercury devices occur at transfer stations prior to scrapping. The Vermont Agency of Natural Resources developed a training manual in the Spring of 2002 that outlines procedures for removing the various mercury devices from appliances. That manual can be found online at: http://www.anr.state.vt.us/dec/ead/mercury/PDF/appman.pdf

[16] EPA Region 5: Mercury Switches in Appliances: Final Report -August 23, 2001 http://www.epa.gov/region5/air/mercury/appliancereport.html

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Mercury Switch Removal – House Bill 477 and Senate Bill 88

In the 2006 General Assembly session, two identical bills were introduced requiring the removal of mercury switches in certain motor vehicles prior to their demolition. These bills authorize the Virginia Solid Waste Management Board to adopt regulations concerning the criteria and standards for removal of mercury switches. The legislation was passed and signed into law by the Governor.

The new Virginia Code section now reads:
§ 46.2-635. Surrender of certificates for vehicles to be demolished; securing new title certificates.

Every person disposing of a motor vehicle, trailer, or semi trailer which is to be demolished shall make an assignment of title to the transferee as provided in § 46.2-628. The assigned certificate of title, when available, however, shall be delivered to the Department, accompanied by a form provided by the Commissioner, stating that the vehicle is to be demolished *and certifying that, before demolition, a good faith effort was made to remove mercury switches in vehicles manufactured for the 2002 model year and preceding model years.* On receipt of this form and the assigned title, the Commissioner shall forward to the transferee a receipt for them. *Manufacturers of vehicles sold in the Commonwealth shall be responsible for providing a method for storing, shipping, recycling, or disposing of mercury switches removed from vehicles manufactured by them. For purposes of this section "mercury switches" means each mercury-containing capsule, commonly known as a "bullet," that is part of a convenience light switch in a vehicle manufactured for the 2002 model year or any preceding model year.*

While this legislation provided guidance on Virginia's desire to have mercury switches removed from vehicles before demolition, it is voluntary and relies on a "good-faith effort" to achieve this goal. It also fails to address mercury contained in appliances.

Mercury Switch Removal Programs

Many states have implemented voluntary mercury switch removal programs. Some of these have a legislative mandate (as seen in the chart below) but most are still considered "good-faith efforts". Most of these programs are similar to what is being discussed in Virginia.

Summary Table of State Mercury Car Switch Initiatives						
State Name	Statute	Voluntary	Pilot	Outreach Only	Bounty	Non-Bounty
California	✓					✓
Colorado		✓				✓
Connecticut		✓	✓			✓
Indiana		✓		✓		✓
Maine	✓				✓	
Michigan		✓				✓
Minnesota	✓	✓	✓			✓
New York	✓					✓
Ohio				✓		✓
Pennsylvania		✓	✓		✓	
Vermont		✓	✓		✓	
Wisconsin		✓				✓
From EPA - http://www.epa.gov/epaoswer/hazwaste/mercury/carswich.htm						

New Jersey recently adopted a mandatory switch removal program that may be more effective than the previously mentioned voluntary programs. According to the New Jersey Department of Environmental Protection, the following are affected by the mandate:

- Manufacturers of vehicles containing mercury switches sold within the State of New Jersey
- Vehicle recyclers who sell, give, or otherwise convey ownership of end-of-life vehicles containing mercury switches to scrap recycling facilities
- Scrap recycling facilities that accept end-of-life vehicles that have not been intentionally flattened, crushed or baled, and contain mercury switches.

Vehicle recyclers and scrap recyclers that accept end-of-life vehicles are required to:

- Remove the mercury switches from the end-of-life vehicle
- Maintain records documenting the number of mercury switches collected, the number of end-of-life vehicles containing mercury switches including vehicle identification numbers (VIN), and the number of end-of-life vehicles processed for recycling
- Handle all removed mercury switches in accordance with the Department's universal waste regulations.

Vehicle manufacturers are required to:

- Identify the make, model and year of each vehicle produced that contains mercury switches

- Describe the type and location of the switches
- Provide safe and environmentally sound methods for the removal of the switches
- Provide containers to recyclers to store the removed switches
- Pay for the cost of transportation of the switches to an appropriate waste or recycling facility
- Pay a minimum of $2.00 per removed switch to regulated recyclers and $0.25 per removed switch to the Department
- Submit a mercury minimization plan to the Department

Manufacturer	Plan Approval Date	Mandatory Mercury Switch Removal Date
Subaru	October 17, 2005	November 16, 2005
End-of-Life Vehicle Solutions Group: Audi BMW Daimler Chrysler Ford Lincoln Mercury Volvo General Motors Mitsubishi Nissan Volkswagen	April 11, 2006	May 11, 2006
Toyota	These vehicles do not contain regulated mercury switches. Therefore, no mercury minimization plan is required.	

As well New Jersey is requiring Iron and steel scrap-melters to install costly pollution control technologies if mercury switch removal fails to meet a 75 percent reduction of current emission. Under the recently adopted rule (January 2004), these facilities will have until January 3, 2010 to achieve this goal. This would be the first statewide emission limit in the nation for mercury emitted by iron and steel melters.

More information on New Jersey's Recycling Program can be found at:
Recycling regulations: http://www.nj.gov/dep/dshw/resource/recyreg03.pdf
Guidance on management of mercury containing devices:
http://www.state.nj.us/dep/dshw/lrm/uwaste/uwdevices.htm

Rule on Electric Arc Furnaces (EAFs), and related Regulatory Activities:

In 2007, EPA plans to propose a comprehensive rule for steel mills that use EAFs to address emissions of mercury, lead, and other metals and organic hazardous air pollutants. EPA plans to pursue voluntary programs in parallel with the development of regulations to ensure mercury emissions reductions. These actions collectively are expected to greatly reduce mercury air emissions from EAFs over the next ten years.

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New Jersey promulgated Control and Prohibitions of Mercury Emissions in 2004. The rule covers Iron or Steel Melters, and requires that:

On and after January 3, 2010, each owner or operator of an iron or steel melter of any size shall operate the iron or steel melter in accordance with the provisions specified in either 1 or 2 below.

1. The emissions of mercury from any iron or steel melter shall not exceed 35.0 mg/ton based on annual weighted average of all valid stack emission tests performed for four consecutive quarters weighted for the production each quarter, or
2. The reduction efficiency for control of mercury emissions of the air pollution control apparatus of any iron or steel melter shall be at least 75% based on the annual weighted average of all valid stack emission tests performed for four consecutive quarters weighted for the production each quarter.

Additionally, the owner or operator of an iron or steel melter is required to submit written plan establishing mercury in scrap minimization program. Each mercury minimization and source separation plan must include the information specified in the paragraphs below:

a) A materials acquisition program specifying that the iron or steel melter will only purchase mercury free scrap or will purchase scrap only from scrap suppliers that remove accessible mercury switches from the trunks, hoods, and anti-lock braking systems of automobile bodies.
b) Procedures for visual inspection of a representative portion, but not less than 10 percent, of all incoming mercury free scrap shipments to ensure that the shipments contain only mercury free scrap

Limiting Future Use of Mercury Switches:

In June 2006, EPA proposed a rule that would impose requirements on any future use of these types of mercury containing switches in passenger vehicles.

The National Vehicle Mercury Switch Recovery Program (NVMSRP):

EPA announced a national program on August 11, 2006 that will help cut mercury emissions. A Memorandum of Understanding to establish the National Vehicle Mercury Switch Recovery Program was entered into by the EPA and key partners described below. The MOU sets out how the Parties intend to structure and implement this voluntary program. It does not impose nay legally binding obligations on USEPA, nor is USEPA imposing through the MOU, any legally binding obligations on any of the Parties or any other entity. This Program has five elements:

1. Education and outreach for those removing switches
2. Removal, collection and management of switches
3. Recordkeeping and accountability of mercury recovery
4. Scrap selection and corroboration, and

5. Review and improvement of the NVMSRP

This is a collaborative approach to reducing mercury air emissions designed to remove mercury containing switches from scrap vehicles. This program will complement existing State mercury switch reduction efforts; will help reduce up to 75 tons of mercury emissions over the next 15 years. It is the result of a two-year collaboration involving EPA, States, Environmental Organizations, and several Industry Sectors. The following are roles of key partners:

- Ten automakers created the End of Life Vehicles Solutions Corporation (ELVS), which will provide dismantlers with information and supplies needed for switch removal, collect and transport switches to proper recycling and disposal facilities, and track program performance.
- Participating dismantlers will remove mercury-containing switches and ship them to ELVS, giving the dismantlers the ability to market reduced mercury scrap and earn recognition and certain financial incentives.
- Participating scrap recyclers will build awareness of the mercury switch removal program in their own industry and in the dismantling industry, which is their chief supplier of scrap vehicles.
- Participating steelmakers will educate and encourage their supply chain to participate, and will take steps to purchase scrap metal generated from participating dismantlers and recyclers that have removed the mercury containing switches.

Pollution Control Technologies

The major raw material used in the EAF steelmaking process is steel scrap. Improvement of raw material quality by feed process material modification is the greatest pollution prevention for mercury emissions. Removal of mercury switches prior to shredding of automobiles is necessary.

As the largest recyclers in North America, the member companies of the Steel Manufacturers Association are committed to practical and cost-effective removal of mercury from the scrap metal supply. SMA recognizes that pollution prevention is the key to avoid mercury entering the environment. Mercury is now eliminated from the design of new vehicles and other products. In the short, term, mercury switches and other components must be removed from end-of-life vehicles and other products prior to crushing or shredding. Mercury can not be removed from the steel mill scrap feed after the recycled material has been crushed or shredded.

Many states consider switch removal to be the most effective control for mercury emissions from the steel and scrap industry. The most common types of system for the melting of steel and scrap are cupolas and electric arc furnaces. The most effective pollution control technologies for these are carbon injection systems, scrubbers and baghouses. As New Jersey is the only state at this time with mandated reductions, it was the only reliable source for technologies and reduction rates as well as economic impact figures for this industry.

New Jersey's rule requires an emissions rate no more than 35.0 mg/ton (milligram of mercury emissions per ton of iron or steel production), based on the annual weighted average of all valid stack emission tests performed for four consecutive quarters weighted for the production each quarter. Under this requirement, stack tests at one facility (cupola) that has carbon injection, bag houses and scrubbers (cupola) resulted in 8 mg/ton emission rate. While final figures have not been determined from an electric arc furnace with carbon injection, the rate is below 35 mg/ton.

Cost of Controls

The following information is directly from the New Jersey Dept. of Environmental Protection - Control and Prohibition of Mercury Emissions- NJ DEP 2004 http://www.nj.gov/dep/aqm/hgprop.pdf

Based on the preliminary findings of the New Jersey pilot project, removal of each switch from an end of life vehicle takes less than one minute. The Department estimates that the cost to remove one pound of mercury through this type of source separation would be about $1140.00, assuming the cost of switch removal is $2.00 per switch ($1.00 for removal and $1.00 for program administration cost). These numbers are consistent with estimates provided to the Department by one of the iron or steel melters and the USEPA.

The New Jersey proposed rule additionally sets emission limits for iron or steel melters, which in essence provides a quantitative measure of the success of mercury in scrap removal. Only if mercury in scrap removal is not successful would there be capital costs as a result of New Jersey rule. Four of the six facilities are currently employing fabric filters (baghouses) and the other two facilities have afterburners and venturi scrubbers. The Department expects that the four facilities that have baghouses can comply with the standard by injecting powdered activated carbon (PAC) if source separation alone does not reduce mercury emissions to the new limit. The facilities with scrubbers might either install baghouses with PAC, or add chemicals such as sodium hypochlorite to their scrubbing solution to remove mercury from the gas stream.

If the two facilities with scrubbers choose to install baghouses with PAC injection, the

Department estimates that the cost of installation would range from $5,400 to $27,000 per pound, depending on the size of facility. In accordance with the USEPA Control Cost Manual, this cost estimation is based on the total of direct annual cost (purchased equipment cost and direct and indirect installation cost) and indirect annual cost (labor, material, electricity, and insurance). The Department also estimates that the cost of chemical additives for the facilities with scrubbers would range from $1,000.00 to $16,000 per pound of mercury removed, assuming the annualized operating cost of sodium hypochlorite additive is $1.40 per cubic meter per hour of flue gas flow rate.

If a facility with a baghouse needs to add PAC injection, this may cost the facility between $6,000 and $38,000 per pound of mercury removed. In accordance with the USEPA Control Cost Manual, this cost estimation is based on total of direct annual cost (purchased equipment

cost and direct and indirect installation cost) and indirect annual cost (labor, material, electricity, and insurance). Costs vary due to the size of facility.

The proposed new rules may increase stack emission testing costs for the existing facilities. The Department estimates that stack emission testing costs between $10,000 and $15,000 for a single unit (inlet and outlet, three test runs). Any owner or operator of an iron or steel melter who achieves and maintains compliance during eight consecutive quarters, may reduce the frequency of compliance stack emission testing from each quarter to compliance stack emission testing performed every fourth quarter after the eighth quarter test in which compliance was determined. One quarter of stack testing in every four consecutive quarters would result in reduced stack emission testing cost. Air Pollution Control permits already require periodic mercury testing. Costs of testing only increase to the extent that the testing required by this rule increases the testing already required by the permit.

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TAB D-1(b): Analysis and Control of Mercury Emissions from Coke Ovens

Virginia has one coke production facility in operation. This source category-represented by one plant (Jewell Coke) emitted 343 lbs. of mercury in 2004, which represents 16% of all mercury in the state that year. Jewell Coke is a chemical non-recovery, metallurgical coke production facility located in Buchanan County, Virginia. This is the second largest source of mercury from the Non EGU sector.

Coke Production - Recovery vs. Non-Recovery

Metallurgical Coke is most often used for blast furnaces, foundries, and related uses. Coal is transferred from storage, crushed if necessary, and charged to the coke ovens via open and enclosed belts and conveyors. Ovens using chemical non-recovery coking technology involve using the volatile fraction driven off the coal as fuel for carbonization, producing heat, carbon dioxide and water vapor.

Unlike Chemical non-recovery coke production, recovery systems process coke oven gas by a series of steps that clean the gas prior to its use as fuel and release to the atmosphere. Because coal contains trace levels of mercury, all coking facilities are a source of mercury emissions. However, available information indicates that mercury emissions from coke production utilizing a chemical recovery system can be effectively controlled (greater than 90 percent collection of mercury). However, recovery systems may have issues with complexity and gases as well as waste.
Source: Illinois EPA http://www.epa.state.il.us/public-notices/2004/chicago-coke/project-summary.pdf

Recently Permitted Non-Recovery Coke Production Facilities

Research indicates only a couple states that have recently permitted or are in the process of permitting new or modified coke production facilities requiring mercury controls. Below are descriptions of the two examples that provided the most information.

Pennsylvania – Cambria Coke Plant
Pennsylvania DEP recently approved an air plan for the Cambria Coke Plant in Cambria County in southwestern Pennsylvania however the permit was vacated by the applicant. This facility would have been a 280-oven heat-recovery coke plant designed to process 2.55 million tons of coal into 1.7 million tons of metallurgical coke each year and produce 165 megawatts of electricity. The facility would have been a chemical non-recovery coke plant. State authority was used to require a 93 percent reduction of mercury emissions. Under Pennsylvania Code Section 127, Best Available Technology (BAT) is required. It was Pennsylvania's interpretation that this authority extended to hazardous air pollutants and toxics. At this time Pennsylvania is currently working on a Mercury regulation, but it is in draft form and appears to address EGU's only.

At the Cabria facility, sulfur dioxide and particulate matter would have been controlled using a dry limestone scrubber and baghouse to capture emissions which provide some co-benefit for mercury control. Additional reductions would have been achieved by injecting activated carbon

into the gas stream before the particulate control device. Kathleen A. McGinty, Secretary of the Pennsylvania Department of Environmental Protection stated, "The Cambria Coke project is state of the art, setting an example for investments in emission controls that can and should be deployed across the nation".

From Cambria Coke Conditions – Pennsylvania DEP:

16. The owner/operator shall attempt to meet a mercury emission rate from the main stack of 47 pounds per 12-month rolling average period by installing, operating, and maintaining a system for the injection of carbon into the waste gas exhaust stream at a rate not to exceed 2.0 pounds per million actual cubic feet of exhaust gas. (25 Pa. Code § 127.12b)

A. The mercury emission rate from the main stack shall be tested during the initial performance test, and once each year thereafter. Records of carbon specifications, carbon injection rate, coal analysis, coke production rates, and other available operating parameters shall be recorded during each stack test.

B. For the first 90 days of production, owner/operator shall test the mercury content of the coal used in the coke batteries once each week. Provided that the weekly testing can demonstrate that there is little variability (+/- 25%) in the mercury content of the coal feedstock, testing for mercury content of coal may be reduced to once each month. In every case, the mercury content of each new coal supply shall be tested.

C. Annual mercury emissions shall be monitored using a continuous emission monitoring system (CEMS) based on an EPA promulgated instrumental reference method for mercury. Alternatively, if the owner or operator demonstrates to the satisfaction of the Department that available CEMS are not reliable or do not accurately measure the mercury emissions from non-recovery coke ovens, the annual mercury emissions shall be monitored using engineering calculations based on stack test data, coal analyses, and carbon injection rate records.

Authorizing Pennsylvania Code Section 127:
http://www.pacode.com/secure/data/025/chapter127/chap127toc.html

Ohio – FDS Coke Plant, LLC

This proposed facility would be located in Oregon, Ohio. While the final permit was issued on September 20, 2005, the facility has yet to be constructed. This particular permit generated a significant amount of public interest. The permit was issued with a mercury control over 90 percent, limiting mercury emissions to .0255 tons per year. The facility could have emitted up to 680 pounds of mercury without any pollution controls and without taking into consideration controls for other pollutants that would have co-benefits.

Activated carbon injection and a lime-coated baghouse would be the primary pollution control technologies required to achieve this level of reduction. According to Ohio EPA, these devices are considered unsurpassed in their technology and were recognized as Best Available

Technology for this type of facility. There will also be constant monitoring of the chlorine content in the coal used at this facility. Differences in the chlorine content of different coal types will affect the control technology as chlorine enhances the removal efficiency of mercury control technology.

Specific Language from the final permit:

I. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table

Operations, Property, and/or Equipment	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
B901- (2) Nonrecovery Coke Oven Batteries consisting of 84 ovens per battery (Batteries A and B) with heat recovery steam generators	40 CFR Part 63, Subpart A	See Part II , Sections A.1 through A.15 and Part III., Section A.I.2.g.
Waste gas from coking process with staged combustion, lime spray dryer, baghouse and activated carbon injection	OAC rule 3745-31-05(A)(3)	0.04 pound per hour and 0.13 ton per rolling 12-month period lead emissions from the main stack;
		0.12 pound per hour and 0.1 ton per rolling 12-month period lead emissions from all heat recovery steam generator (HRSG) bypass vent stacks combined;
		1.93 pounds per hour and 5.42 tons per rolling 12-month period total hazardous air pollutant (HAP) emissions from the main stack;
		1.42 pounds per hour and 0.96 ton per rolling 12-month period total hazardous air pollutant (HAP) emissions from all HRSG bypass vent stacks combined;
		0.006 lb/hr and 36 pounds per rolling 12-month period of mercury emissions from the main stack;
		0.081 lb/hr and 15 pounds per rolling 12-month period of mercury emissions from all HRSG bypass vent stacks combined;

2.t The permittee shall install, operate, and maintain an activated carbon injection system for the control of mercury emissions. The activated carbon injection system shall be designed for a maximum activated carbon injection rate of 2 pounds of activated carbon per million actual cubic feet of exhaust gases at the point of injection. The activated carbon shall consist of readily available untreated commercial products that originate from bituminous or lignite coal. The untreated activated carbon shall meet a minimum iodine content of 500 mg/g and a physical specification of at least 90% by weight passing through a 325 mesh U.S. Sieve Size. The permittee may petition to the Director to increase the allowable mercury emission limitation. The Director may increase the allowable mercury emission limitation, if the permittee demonstrates to the satisfaction of the Director that the activated carbon injection control system has been optimized within the limits of this paragraph.
2.u Since there is not much information available on lead and mercury emissions from non-recovery coke ovens, Ohio EPA may increase the lead and/or mercury emission limitations for main stack and bypass vent stack on the results of the lead and mercury emission testing required to be conducted under Section A.V.
2.v This emissions unit is not an affected facility under 40 CFR Part 60, Subpart Da, or 40 CFR Part 75. However, as part of complying with BAT, the permittee shall comply with the mercury sorbent trap monitoring system requirements under 40 CFR Part 60, Subpart Da and 40 CFR Part 75 that are determined by the Director to be applicable to the permittee.

11. The permittee shall maintain an activated carbon injection rate of 2 lbs/mmacf. A reduced activated carbon injection rate operational restriction may later be established by Ohio EPA, if the permittee demonstrates to the Director's satisfaction that a lower activated carbon injection rate can achieve the mercury emission limitation.

The final permit can be found at: http://www.epa.state.oh.us/dapc/pti_issued/pti_pdf_05/04013600fm1.pdf

Control Technology and Cost

As described above, activated Carbon injection and lime-coated baghouse systems are the most effective method for reducing mercury emissions from non-recovery plants. The only source of cost estimates from this type of control was from Pennsylvania and that applicant abandoned its permit. According to PA DEP, an activated carbon injection system for the Cambria facility would have required a $1.5 million capital investment and costs $2 million per year to operate.

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TAB D-1(c): Analysis and Control of Mercury Emissions from Paper Mills

There were 5 Paper Mills reporting mercury emissions to the air in the TRI report. This section of the report summarizes the breakdown of mercury emissions at Paper mills, available control technology, technical feasibility and costs of mercury controls.

1) Breakdown of Mercury Emissions within Source Category of Kraft Paper Mills

Of the 2004 reported TRI emissions of mercury in Virginia, approximately 7.3% of the mercury emissions came from Paper Mills. The majority of this paper mill data is from emission factors developed by National Council for Air and Stream Improvement (NCASI). This organization is a technical research arm for the paper industry. NCASI has conducted limited stack testing at paper mills, and generated emission factors for overall paper industry use for reporting of mercury. These Boiler MACT regulations (40 CFR Part 63 Subpart DDDD) will impose mercury limits on existing solid fuel fired boilers (7 lb/TBTU) and new solid large fuel fired boilers (3 lb/TBTU). These regulations require compliance by Sept. 2007 and will further reduce mercury emissions from this subcategory of industrial boilers. DEQ will have an opportunity to review impacts from these sources during the residual risk review of the second phase of these MACT regulations.

In 2004, limited site specific stack testing data was available for paper mill power boilers in Virginia. However, recent regulations such as Boiler MACT, 40 CFR Part 63 Subpart DDDDD-National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters, have required sources to perform site specific stack testing for mercury. More accurate site specific emissions data is currently being generated by affected sources for mercury, and this emissions data will show up in future year's TRI reports.

A survey of these paper mills using the 2003 TRI report (2004 report was not yet out at time of survey) shows that the majority (85%) of the mercury emissions at these paper mills is from non-EGU power boilers. There are a total of 16 of these non-EGU power boilers located at paper mills in Virginia.

The remaining 15% of the source of mercury reported in the 2003 TRI report from paper mills include 22 smaller miscellaneous process units such as lime kilns, recovery boilers, and recovery boiler smelt dissolving tanks. Together, these 22 smaller process units emit insignificant amounts of mercury as compared to the power boilers at paper mills. Mercury control technology for these units is not technically feasible, and is not currently in commercial operation.

Again, the majority of mercury emissions at paper mills comes from the power boilers. These power boilers in paper mills are very different from large EGU boilers in the state. Most utility plants have large boilers with the purpose of providing electricity for sale to consumers. EGU's employing conventional SO2 and PM control technologies yield mercury reductions as a co-benefit, and EGU's will see mercury reductions as part of upcoming CAIR rules.

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Paper mills have multiple smaller power boilers at their plants for operational flexibility with the purpose to provide steam for the papermaking process. Most of these power boilers at paper mills are combination fuel boilers. They typically fire wood waste (bark) which is a byproduct of the wood processing step of papermaking, and also fire coal, oil and/or natural gas. The majority of mercury emissions from paper mill power boilers come from burning coal as fuel.

a) Speciation of Mercury in Air Emissions

When discussing control technologies for mercury, it is important to know the speciation of mercury in the emissions that are to be controlled. There are three primary mercury-containing chemicals that are emitted from power boilers: elemental mercury ($Hg^{0)}$, oxidized or ionized mercury or soluble mercury ($Hg^{2+)}$, and particulate bound mercury ($Hg^{p)}$ that binds to fly ash. During combustion, the mercury in coal is volatilized and converted to elemental mercury (Hg^0) in the high temperatures regions of the boilers. As the flue gas is cooled, a series of complex reactions begin to convert elemental mercury to ionic mercury compounds and/or particulate bound compounds. This partitioning of mercury is known as mercury speciation.

This mercury speciation has a considerable influence on selection of mercury control technology options. Different forms of mercury have different chemical properties that in turn affect their susceptibility to being removed from flue gas. For example: fabric filters will be highly effective at removing particulate bound mercury (that which is adsorbed to or bound to fly ash), but less effective at removing ionic and elemental mercury. EPA's report on "Control of Mercury Emissions from Coal-Fired Electric Utility Boilers" states that the majority of mercury in bituminous coal-fired boilers is ionized mercury or Hg^2, where the majority of mercury in sub-bituminous and lignite fired boilers is elemental mercury or Hg^0. Limited mercury speciation data exists for power boiler emissions in the state, at least among paper mills surveyed.

Another source of mercury speciation data is from a report circulated by DEQ to the regulated community in Virginia as part of the mercury modeling effort being planned for non-EGU's. This report was written by EPA's Office of Air Quality Planning and Standards (OAQPS) in March 2005. The report was titled "Emissions Inventory and Emissions Processing for the Clean Air Mercury Rule (CAMR)." Appendix B of this report lists EPA suggested mercury speciation percentages for all the various MACT code descriptions. For example, the Pulp and Paper Production – Pulping and Bleaching Systems at Kraft mills (MACT Subpart S) is shown as having a mercury speciation ratio of 20% particulate fraction, 30% gaseous fraction, and a 50% elemental fraction. Similarly, the MACT category of Industrial/Commercial/Institutional Boilers and Process Heaters burning oil, natural gas or coal is shown as having the same mercury speciation ratio as above. Using these generalized mercury speciation factors for all sources within a MACT source category may be misleading as many factors can influence mercury speciation. A number of these factors will be described below.

Chlorine content of coal can be a major predictor of the specific mercury containing chemicals that will be found in flue gas. Ionic mercury (or mercuric chloride) can be formed through the reaction of chlorine and elemental mercury in low temperature flue gas.

Flue gas residence time is also a factor in mercury removal efficiencies. A longer residence time (longer duct work runs) allows additional time for the formation of ionic mercury to occur. Paper mill power boilers would most likely have shorter duct work than EGU's due to their smaller size, and the boilers being located within an industrial complex.

The level of unburned carbon in the flyash (as traditionally measured by Loss on Ignition or LOI) tends to increase the fraction of mercury bound to particulates.
The temperature and composition of the flue gas can affect the adsorption (binding) of mercury to flue gas solids.

Since plant configurations, coal constituents, flue gas characteristics, and flyash LOI contents vary widely, mercury speciation in flue gas also varies widely. These issues therefore affect the ability of various control technologies to remove mercury uniformly, and make it difficult to prescribe one technology that would work for all non-EGU power boilers.

2) Control Technology/Pollution Prevention Options

Paper mill power boilers are already being regulated for mercury reductions under EPA's "National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial and Institutional Boilers and Process Heaters (40 CFR Part 63), which was finalized in Sept. 2004. This regulation has a mercury emission limit of 9 lb/Trillion BTU for existing solid fuel fired units, and a compliance deadline of Sept. 2007. EPA chose to set these limits as acceptable mercury emission limits on industrial power boilers. Paper mills are currently making plans and installing controls where necessary to meet these compliance deadlines.

There are two broad approaches to mercury control in boilers:
1) Activated carbon injection (ACI), and 2) multi-pollutant control in which mercury capture is enhanced in existing/new SO_2, NO_x and PM control devices.

In activated carbon injection technology (ACI), powdered activated carbon is injected into the flue gas at a location in the duct preceding the PM control device, which is usually an electrostatic precipitator (ESP) in paper mills. The activated carbon sorbent binds with the mercury in the flue gas and in the PM control device. The mercury containing activated carbon is captured in the PM control device. Greater mercury removal is obtained in a fabric filter compared to an ESP because of enhanced gas-particle contact in the filter cakes on the surface of the bags in a fabric filter. The mercury containing ash and the sorbent would need to be properly disposed of –either in onsite landfills or in commercial landfills.

Current experience with activated carbon injection is mainly with EGU's. However, the applications to other boilers or incinerators may not be directly transferable due to the following reasons: the quality/chloride content of various fuels fired, and the larger size of EGU boilers. In larger EGU boilers, the duct dimensions are also much larger. The length of ductwork and therefore the residence time for mixing the injected activated carbon and the flue gas affects amount of mercury capture.

Activated carbon injection has the potential to achieve moderate levels of mercury control. One study for the American Forests and Paper Association estimates 50% mercury removal in paper mill boilers using activated carbon injection followed by a fabric filter. The majority of paper mill boilers currently use electrostatic precipitators for particulate control, so both activated carbon injection and fabric filters would need to be installed. Fabric filters are somewhat of a safety issue (fire hazard) in a combination coal/wood fired boiler, as is found in paper mills, due to the carryover of burning wood embers/particles into the fabric filter. Again, the success of the activated carbon injection and the fabric filter would depend on the speciation of mercury in the flue gas stream. This speciation would dictate how much mercury could be removed by the control device. This mercury speciation depends on a number of factors and is very site specific based on boiler design, etc, as described above.

Particulate matter and sulfur dioxide controls can achieve significant mercury reduction as a co-benefit. As was described in a previous SAB report on mercury controls for EGU's, the following table adapted from presentations at a NC Division of Air Quality Workshop shows these reductions:

Controls	% Hg removal from bituminous coal	Duke Energy: % Hg removal from bituminous coal	% Hg removal from sub-bituminous coal
PM Only			
*Cold side ESP	46	25-35	16
*Hot side ESP	12	0-9	13
*Fabric filter	83		72
*PM scrubber	14		0
Dry FGD			
*SDA+ESP			38
*SDA+FF	98		25
Wet FGD			
*CS ESP+Wet FGD	81	80-90 (with SCR), 55-65 (w/o SCR)	35
*HS ESP+Wet FGD	55		33
*FF+Wet FGD	96		

ESP: Electrostatic precipitator, FGD: flue gas desulfurization, SDA: spray dryer adsorber, SCR: selective catalytic reduction of NOx, FF: fabric filter (or baghouse)

Mercury removal by wet FGD varies considerably depending on coal quality and combustion and post combustion conditions. This is because elemental mercury is poorly soluble in water whereas ionized, soluble mercury can be absorbed and captured in a wet SO_2 scrubber.

EGU's/plants that use SCR for NO_x control may also see enhanced mercury removal since elemental mercury may be oxidized to soluble form as it passes through the SCR unit.

3) Technical Feasibility and Costs

Costs for control of paper mill power boilers was obtained from an American Forests and Paper Association Report titled "Emission Control Study – Technology Cost Estimates (Sept. 2001)." This report stated that a 50% reduction in mercury could be achieved by injection of activated carbon into flue gas, followed by installation of a baghouse downstream of existing precipitators. EPA factored and estimated costs for one paper mill location in Virginia that houses three power boilers. EPA estimates put the cost at $7.4 MM for these mercury controls on the three boilers. A second cost estimate for the same paper mill's three power boilers in Virginia provided by BE&K consultants using site specific conditions provided a cost estimate of $23.6 MM. Converting this capital cost range for controls of $7.4 MM to $23.6 MM to a $/lb of mercury removal, gives $158,000/lb to $505,000/lb of mercury removal. This assumes 100% of the mercury emissions would be removed, which would be a conservative estimate and would need to be corrected based on site specific mercury speciation data.

Flue Gas Desulfurization (FGD) is currently in place at some large EGU's but is not typically installed on smaller industrial power boilers, such as those found in paper mills.

Incomplete combustion to leave carbon in the fly ash may also provide enhanced mercury removal. Carbon absorbs mercury. However, there are two disadvantages to leaving carbon in the fly-ash through combustion controls. One is that there is a loss of efficiency in steam production from fuel which is a cost penalty for the paper mill. The second disadvantage is that the resulting fly-ash may be unsuitable for cement production or other byproduct reuses due to high carbon content in ash.

Coal cleaning, other additive and sorbents, catalytic and plasma based processes, and other advanced technologies are being developed and demonstrated for mercury and multi-pollutant removal but have not been well demonstrated in commercial operations.

The fate of mercury capture in sludge by PM controls or through other means must be monitored to assure that mercury is not just shuffled from air to solid waste, and that it does not become an environmental threat in landfills, or in groundwater underneath landfills.

In summary, paper mill power boilers represent 7% of Virginia's mercury emissions (as shown in the TRI reports, and mainly based on emission factors and not site specific stack tests). This 7% is spread out over 16 small multiple fuel fired boilers used to produce steam for the papermaking process. The effectiveness of mercury control devices for non-EGU's at paper mill

power boilers is related to differences in mercury speciation. Very little data exists for mercury speciation in paper mill emissions, and it is very expensive to test for. The mercury speciation results from multiple operating conditions at the plants. Mercury speciation is due to chlorine content of coal, loss of ignition (LOI) in ash, temperature of flue gas, and length of ductwork at plant. These variables make choosing a one size fits all technology for paper mill boilers very difficult. Activated carbon followed by a fabric filter would be the most likely add-on control device for these boilers. However, effectiveness of these activated carbon injection and fabric filters would be highly variable due to operating conditions (mercury speciation), and installation costs would be very expensive.

Sources of information:

1. AFPA Boiler MACT White Paper – "Analysis of the MACT Floor for Mercury Control from Industrial Boilers"
2. AFPA Study by BE&K Engineering – "Emission Control Study – Technology Costs Estimates"
3. EPA's website on Mercury – "Controlling Power Plant Emissions: Controlling Mercury with Existing Controls" (www.epa.gov/mercury/control_emissions/tech_exist.htm)
4. EPA's Office of Research and Development – RTP, NC –"Control of Mercury Emissions from Coal-Fired Electric Utility Boilers".
5. EPA's website on Mercury – "Controlling Power Plant Emissions: Mercury Specific" (www.epa.gov/mercury/control_emissions/tech_merc_specific.htm)

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TAB E-1(a): OTHER NON-EGU SOURCES - Incinerators

In 1990, Municipal Waste Incinerators accounted for approximately 20 percent of the nationwide mercury air emissions [http://earth1.epa.gov/ttn/atw/combust/utiltox/hgwt1212.html] and as much as 45% of the mercury emissions in the Northeast region []. However, mercury deposition rates during the 1980's were less than about half of the deposition rates that occurred during the 1950's, with a peak in emissions in about 1960, see the following web link, [http://www.fossil.energy.gov/programs/powersystems/pollutioncontrols/overview_mercurycontrols.html]. The amount of mercury attributable to MWCs has significantly declined because of the 1995 Maximum Achievable Control Technology (MACT) standards promulgated by EPA. The regulations set emissions limits which represented approximately 90% reduction in mercury emissions from large MWCs. There were no mercury air emissions reported from municipal waste incinerators or sewage sludge incinerators in the 2003/ 2004 Virginia TRIs. However, these sources have the potential to emit substantial amounts of mercury if the processes are not properly managed. This section of the report summarizes potential mercury emissions, typical control technology, technical feasibility and costs of mercury controls for municipal waste and sewage sludge incinerators.

1) Types of Mercury Emissions from Municipal Incinerators

Due to the variability of the incoming waste stream, uncontrolled emissions of mercury are less dependent on the burning characteristics of the incinerator. Instead, the amount of mercury in the incoming waste is a strong indicator of the amount of mercury emitted. In addition, the vapor pressure of mercury makes it difficult to capture under the normal conditions of incineration air pollution equipment, so the removal efficiency is also highly variable. However, high levels of carbon in the flyash have been demonstrated to improve Hg removal by adsorption of the metal onto particulate matter ["Solid Waste Disposal", AP-42, EPA, October, 1996]. Other factors that influence mercury control are the effectiveness of the particulate removal equipment and temperature in the air pollution control equipment. Maintaining a temperature of less than 300-400 ^{o}F is typically necessary to minimize mercury volatility.

The majority of mercury emissions from municipal incinerators has historically been generated by combusting batteries, thermometers, fluorescent tubes and mercury switches in the waste stream. These sources have been significantly reduced by the regulation of mercury content of batteries and by EPA's adoption of Universal Waste requirements that outline how fluorescent tubes must be handled by industrial sources. Many states have also adopted regulations which require control of incoming material to ensure that mercury containing materials are eliminated to the extent possible.

Data on mercury emissions is available from both AP-42 and the background data used in developing the emission guidelines for municipal incinerators.

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a) Speciation of Mercury in Air Emissions

As with other combustion sources, design and efficiency of control technologies depend heavily on the mercury speciation. There are three primary mercury-containing chemicals that are emitted from any source: elemental mercury (Hg^{0}), oxidized or ionized mercury or soluble mercury (Hg^{2+}), and particulate bound divalent mercury (Hg^{+2}) that can generally be captured with the ash.

This mercury speciation has a considerable influence on selection of mercury control technology options. Different forms of mercury have different chemical properties that in turn affect their susceptibility to being removed from flue gas. For example: fabric filters will be highly effective at removing particulate bound mercury (that which is adsorbed to or bound to fly ash), but less effective at removing ionic and elemental mercury. EPA's "Emissions Inventory and Emissions Processing for the Clean Air Mercury Rule" estimates that the majority (58%) of mercury emissions from MWCs are divalent gaseous mercury, or Hg^{2}. Approximately 20% of the mercury is divalent particulate, with the remaining 22% in the form of elemental gaseous mercury.

A number of factors can influence mercury speciation, so these speciation ratios must be validated with stack testing. For example, the amount of chlorine in combustion sources is a well-recognized influence on the final form of mercury in the flue gas. As stated earlier, the amount of carbon also strongly influences the amount of mercury which is removed from the flue gas, and other air pollution design factors such as type of equipment, fabric filter gas-to-cloth ratio, residence times, temperature, pressure, and presence of carbon all affect the final mercury emissions rate.

2) Control Technology/Pollution Prevention Options

The simplest and most effective mercury reduction technique for MWCs is the removal of mercury prior to combustion. EPA regulations over the past twenty years have resulted in less mercury contained in paint, fungicides, and other items that can make it into the waste stream. Similarly, sources have undertaken material sorting practices that further reduce the possibility of mercury being introduced into the MWC feedstream.

Emissions of mercury from MWCs is carefully regulated and monitored by EPA. States have individually adopted EPA's guidelines for Municipal Waste Combustors, but the federal regulations apply to any source burning more than 40 tons per day of waste that is not covered by a state regulation

Several different types of control strategies are used to control air pollution from MWCs. Emission factors for mercury from MWCs equipped with various air pollution control devices are given below [from AP-42]:

Uncontrolled emissions	0.0056 lb/ton
ESP	0.0056 lb/ton
Sorbent Injection/ ESP	0.00396 lb/ton
Spray Dryer/ ESP	0.00326 lb/ton
Sorbent Injection/ Fabric Filter	0.0022 lb/ton
Spray Dryer/ Fabric Filter	0.0022 lb/ton

Sorbent injection may be either activated carbon or sodium compounds. In this technology, sorbent is injected into the flue gas at a location in the duct preceding the PM control device. The sorbent captures the mercury and is removed in the PM control device. Greater mercury removal is obtained in a fabric filter compared to an ESP because of enhanced gas-particle contact in the filter cakes on the surface of the bags in a fabric filter. The mercury containing ash and the sorbent would need to be properly disposed of –either in onsite landfills or in commercial landfills.

3) Technical Feasibility and Costs

MWCs have clearly demonstrated the ability to remove mercury at a relatively high rate compared to other combustion sources. Total cost of mercury controls at MWCs is dependent on what other air pollution equipment is already available, but the cost of sorbent alone has been estimated at approximately $1-2/lb, not including disposal or injection equipment.
CEMs systems to monitor mercury add an extra $130,000-200,000, with annual testing and operating costs of approximately $90,000. [Federal Register / Vol. 70, No. 95 / Wednesday, May 18, 2005 / Rules and Regulations / pp. 28634]

It is very difficult to give a general estimate for the cost of mercury control from these sources, since mercury control is typically achieved using air pollution control equipment installed to control HCl, SO2, and particulate emissions. However, data for the MACT requirements indicates that the controls required to comply with the MACT were approximately $0.01/lb of waste combusted (in 1990 dollars) [EPA response to comments for the Municipal Waste Combustor MACT, 1995].

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TAB E-1(b): OTHER NON-EGU SOURCES - CREMATORIUMS

Install Mercury Controls on Crematoriums or Require Amalgam Removal Prior To Cremation

"An average filling contains an estimated 800 milligrams of amalgam, with the average middle-aged adult having 8 fillings. The average North American adult has 3.2 grams of mercury from dental fillings alone, (8 fillings x 800 mg per filling x 50% of total amalgam is mercury) with the corresponding potential mercury vapor to go into the lungs, blood, and brain (...an average of about three-millionths of a gram a day...)"[17] The amount of mercury that evaporates during the life of the filling is subject to debate. However in *"Mercury Emissions From Crematoria"* by the Department for Environment, Food and Rural Affairs-United Kingdom (DEFRA), the total amount of mercury that would evaporate over a five year period was calculated to be less than one percent.[18] To be conservative, an assumption of a five percent loss will be used.

The Cremation Association of America has compiled data on cremations throughout the United States. In 2003, there were 13652 cremations in Virginia.[19]

13653 Cremations	**x**	**3.2 grams of mercury per person**	**x**	**95% retention of Mercury in filling**	**÷**	**454 grams per pound**	**=**	**91.42 pounds of Mercury emitted by Crematoriums in 2003**

For the United States as a whole there were 695,637 cremations. This equates to approximately 4650 lbs of mercury are emitted into the atmosphere each year from cremations.

Recommendation: With the significant reduction of mercury emissions from other sources, crematoriums are fast becoming a major component of the total mercury emissions. Consideration should be given to requiring dental amalgam be removed prior to cremation (~$3500/lb based on $25 for removing 8 fillings) or requiring crematoriums to install mercury controls.

[17] http://www.mercola.com/article/mercury/no_mercury.htm
[18] http://www.defra.gov.uk/corporate/consult/crematoria-two/consultation.pdf, page 20, note 4
[19] www.cremationassociation.org/docs/WebConfirmed.pdf

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TAB E-1(c): OTHER NON-EGU SOURCES – Consumer Products

Labeling and Disposal Requirements

Starting in 1999 the states in the Northeast and other parts of the country actively began to pursue enactment of legislation focused on reducing mercury in products and waste. In the Northeast these efforts focused on enactment of provisions of the Mercury Education and Reduction Model Legislation. Copies of the Model Legislation are available on this website at http://www.newmoa.org/prevention/mercury/final_model_legislation.htm.

In Oregon the label must state that the thermostat contains mercury and cannot be disposed of unless the mercury is removed and managed properly. This fact sheet provides information for anyone selling a thermostat (www.deq.state.or.us/wmc/solwaste/factsheets/HHWMercLblFS.pdf)[20].

Maine's new thermostat bounty collection law is the nation's first financial incentive[21] to recycle building thermostats that contain mercury, and the first law to require thermostat collection for do-it-yourselfers. The new law mandates that all mercury thermostats be recycled, and provides a financial incentive with a minimum value of $5 on each one turned in. The law requires all manufacturers that sold mercury thermostats in Maine to develop a recycling program. Currently, only the three largest thermostat manufacturers (Honeywell, General Electric, and White-Rodgers) operate such a program through Thermostat Recycling Corporation. The law sets recycling targets and prohibits wholesalers and retailers from selling any thermostat from a manufacturer that is not in compliance with the law. Maine's annual goal of 160 pounds of mercury per year within three years after Phase 2 begins- equates a goal of removing 90% of all mercury thermostats. Maine's bill text is located at http://janus.state.me.us/legis/LawMakerWeb/externalsiteframe.asp?ID=280019944&LD=1792&Type=4&SessionID=6.

Recommendation: Consideration should be given to implementing the model legislation focused on reducing mercury in products and waste. In addition consideration should be given to implementing a bounty program similar to that of Maine.

[20] http://www.mercurypolicy.org

[21] http://www.mercurypolicy.org/new/documents/Mainethermostatlawpressrelease041306.pdf

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TAB F: CONCLUSIONS

1) EGU's represented 58% of the mercury released to the air in Virginia in 2004. These mercury emissions will be significantly reduced due to requirements of the federal Clean Air Mercury Rule (CAMR) and the requirements of HB 1055 passed by the General Assembly. Virginia should calculate the impact of these EGU's mercury reductions on total releases of mercury in the state.

2) The second highest source category contributing to mercury released to the air in Virginia in 2004 was iron/steel melters. Actual reporting of emissions within this source category varies. The primary source of emissions is in mercury switches found in appliances and automobiles. The simplest and most cost effective solution to reducing mercury emissions is to remove mercury switches before shredding and sending to melters. Virginia should consider a mandatory program to remove mercury containing parts in existing vehicle fleet and in appliances. This would prevent the installation of costly end of pipe pollution controls technologies.

3) The third highest source category contributing to mercury released to the air in Virginia in 2004 was coke ovens. One plant reported 16% of the mercury emissions in Virginia. The most technically feasible add-on pollution control equipment would likely be activated carbon injection and a lime coated baghouse. This was proposed Best Available Technology for a plant to be built in Ohio. Typical control costs (from a proposed plant in Pennsylvania) for this type of control equipment was $1.5 MM capital costs and $2 MM/yr in operating cost. The result would be about $4300/lb of mercury removed based on capital cost only.

4) The fourth highest source category contributing to mercury released to the air in Virginia in 2004 was paper mills. A total of 5 paper mills reporting emissions contributed to 7% of the mercury emissions in Virginia. The majority (85%) of the paper mill mercury releases came from a total of 16 small power boilers located at these 5 paper mills. Recently promulgated Boiler MACT Regulations (40 CFR Part 63 Subpart DDDD - National Emission Standards for Hazardous Air Pollutants in Industrial, Commercial, and Institutional Boilers and Process Heaters) have imposed mercury limits on existing and new boilers. These mercury emissions limits will reduce mercury emissions from this subcategory of paper mill boilers by the compliance date of September 2007. To go beyond this level of compliance would be difficult, since the emissions are distributed on 16 small boilers and there is no additional cost effective pollution control technology to lower emissions further beyond the Boiler MACT regulations.

5) The fifth highest source category of mercury released to air (based on our data) is crematoriums. Since they do not report to the TRI, data on actual releases of mercury from those sources is not available. The major sources of mercury in bodies sent to crematoriums are the dental fillings. Estimates from the Cremation Association of America show 3.2 grams/mercury per person, and 95% of retention of mercury in fillings. At a 2003 cremation rate of 13,653 people, this would be 91 pounds/mercury released to air (actual emissions maybe higher due to the fact that mercury is a bioaccumulate). It is recommended that Virginia consider requiring crematoriums to remove dental fillings containing mercury prior to cremation. Cost of mercury removal would be $3500/lb, based on $25 for removing 8 fillings.

6) Other emissions of mercury result from mercury containing thermostats. Maine implemented a law prohibiting the sale of new mercury thermostats for use in residential and commercial buildings and a law that bans the disposal of mercury added products and requires all mercury added products be recycled. Maine utilizes a bounty collection law which contains a financial incentive ($5/thermostat) to recycle building thermostats that contain mercury. Virginia should consider implementing the model legislation focused on reducing mercury in products and waste, and also should consider implementing a bounty program similar to that of Maine.

7) Other states were reviewed to see if additional mercury controls beyond controls for EGU's were in place. A total of 16 states have implemented additional mercury reduction plans. The most common elements of these mercury reduction plans include: mercury recycling; public outreach and education; small business, household and dental/medical waste management; and a reduction of mercury in consumer and commercial products such as mercury switches and thermostats.

ATTACHMENT A

3. This Plan Approval authorizes Cambria Coke Company to construct a heat recovery coke plant Cambria Township, Cambria County. (PA Code Title 25 § 127.12b)

4. Sources at this facility consist of the following: (PA Code Title 25 § 127.12b)

   A. Coal rail unloading (with thawing shed, heater rated at 35 mmBtu/hr), emissions controlled by wet or chemical suppression and enclosure as required to meet opacity and visible emission limits.
   B. Coal truck unloading, six 50-ton bins, emissions controlled by wet or chemical suppression and enclosure as required to meet opacity and visible emission limits.
   C. Coal stockpiles (2), including load-in and load-out, emissions controlled by radial stacker, wet suppression, enclosed load-in, and underpile conveyor for coal reclaim.
   D. Two coal crushing and screening units, emissions controlled by complete enclosures.
   E. Enclosed coal storage, including load-in and load-out, emissions controlled by enclosure.
   F. Coal transfer, emissions controlled by enclosure of transfer points and covering of conveyors except for belts and transfer points downstream of enclosed storage.
   G. Two pushing and charging machines, charging emissions controlled by traveling hoods (one per each charging machine) with fabric filters.
   H. Two hundred and eighty (280) coke ovens, arranged in two 60-oven batteries, and two 80-oven batteries, with waste gas emissions exhausting through seven heat recovery steam generators (HRSGs), emissions controlled by a lime spray dryer and a fabric filter, exhausting through a single main stack. On an annual basis, no more than 4% of the total gas will be emitted through the waste heat stacks during scheduled HRSG maintenance. During periods of scheduled HRSG maintenance, HRSG waste gases may be bypassed through one of the seven individual waste heat stacks without treatment by the spray dryer and fabric filter. During the scheduled maintenance, 40 ovens will exhaust waste gases directly into the atmosphere. These gases will still pass through the common afterburner system, which will fully combust gases prior to release to the atmosphere. During maintenance, 14% of the waste heat gases will be exhausted. Only one HRSG will be maintained at time. When none of the HRSGs are being maintained, 100% of the waste gases will go through the HRSGs, spray dryer, and baghouse.
   I. Two flat push hot cars, pushing emissions controlled by traveling enclosures w/multiclones.
   J. Quench tower, emissions controlled by stainless steel baffles and maintenance of the total dissolved solids content of the quench water below 1100 mg/l.

K. Coke crushing and screening, emissions controlled by a fabric filter.
L. Coke stockpile, including load-in and load-out, emissions controlled by tube stacker. Load-in will be partially enclosed.
M. Coke and breeze transfer, emissions controlled by enclosure of transfer points and covering of conveyors except for belts and transfer points below grade.
N. Coke loadout, emissions controlled by lowering boom.
O. Cooling towers, emissions controlled by make-up water TDS value.
P. Lime silo, controlled by bin vents with filters.
Q. Flue gas desulfurization dust silo, controlled by bin vents with filters.
R. Primary roads, emissions controlled by paving, watering, and good housekeeping.

RESTRICTIONS

5. The annual average sulfur content of the coal feedstock shall not exceed 1.5 weight percent. (PA Code Title 25 § 127.12b)

6. Owner/operator shall operate the coke oven batteries under a negative pressure at all times. (PA Code Title 25 § 127.12b)

7. Each individual waste heat stack shall vent exhaust gases no more than 14 days per consecutive 12-month period. No more than one individual waste heat stack shall vent exhaust gases at a time. (PA Code Title 25 § 127.12b)

8. Short-term emission rates (in pounds per hour) from each source shall not exceed the following, based on a twenty-four hour rolling average for all pollutants: (PA Code Title 25 § 127.12b)

	PM	PM10*	SO2	NOx	CO	VOCs	H2SO4	Lead
Coal charging	2.0	1.4	0.087	-	0.82	0.6	-	0.00004
Main stack	48.0	48.0	583.3	291.7	61.1	6.5	6.4	0.046
Individual waste heat stacks (combined)	34.3	34.3	833.3	41.7	8.7	0.9	9.325	0.13
Pushing	8.4	8.4	28.6	5.5	18.4	3.5	.315	0.004
Quench tower	35.0	12.8	--	-	-	-	-	0.0023
Coke crushing and screening	3.4	3.4	-	-	-	-	-	-

* Allowable PM10 emissions are based on Method 201 or 201A, filterable only. They do not include condensable Method 202.

9. Short-term emission rates (in pounds per hour) for SO2 from the main stack shall not exceed 700 pounds per hour, based on three-hour rolling average. (PA Code Title 25 § 127.12b)

10. Particulate concentrations shall be limited as follows: (PA Code Title 25 § 127.12b)

Source	Gas Flowrate (dscfm)	Concentration (gr/dscf)
Charging machines fabric filter stacks	45,000	0.008
Main stack	>300,000	0.02
Individual waste heat stacks	100,000	0.04
Flat push hot car multicyclone stacks	50,000	0.04
Quench tower	300,000	0.02

11. In accordance with 25 PA Code, §§ 123.1-2, there shall be no fugitive emissions from this facility except those that arise from the use of roads, stockpiling, coke oven batteries, and emissions of minor significance with respect to causing air pollution. All reasonable actions shall be taken to minimize fugitive emissions that arise from the use of roads and stockpiling. Reasonable actions shall include, but shall not be limited to paving, sweeping, and application of water or other dust suppressants. In no case shall fugitive emissions be visible at the point that the emissions pass outside the property of the owner/operator.

12. If an opacity limit is not established elsewhere for a source, then the visible emission limits of PA Code Title 25 § 123.41 shall be in effect. In accordance with this regulation, owner/operator may not permit the emission into the outdoor atmosphere of visible emissions in such a manner that the opacity of the emission is either of the following:

    A. Equal to or greater than 20% for periods aggregating more than 3 minutes in any 1 hour.

    B. Equal to or greater than 60% at any time.

13. Total emissions from the facility shall not exceed the following, on a tons per 12 consecutive month rolling average basis: (PA Code Title 25 § 127.12b)

	PM	PM10*	SO2	NOx	CO	VOCs	H2SO4	Lead
Source								
Coal rail unloading (with thaw shed)	1.32	1.21	0.09	14.74	12.38	0.81	-	-
Coal truck unloading	0.46	0.22	-	-	-	-	-	-
Coal Pile (including load-in and load-out)	2.98	1.47	-	-	-	-	-	-
Domed coal (including	0.22	0.10	-	-	-	-	-	-

load-in and load-out)								
Coal crushing and screening	2.04	1.02	-	-	-	-	-	-
Coal transfer	4.94	2.34	-	-	-	-	-	-
Coal charging stacks	8.71	6.29	0.38	-	3.58	2.56	-	0.0001
Main stack	210.24	210.24	2555.0	1277.5	267.51	28.66	28.11	0.2
Individual waste heat stacks	40.32	40.32	980.0	49.0	10.26	1.10	10.78	0.15
Pushing stacks	36.54	36.54	125.2	24.28	80.48	15.34	1.38	0.019
Quench tower	153.3	56.21	--	-	-	-	-	<0.01
Coke crushing and screening	15.02	15.02	-	-	-	-	-	-
Coke storage	1.45	0.69	-	-	-	-	-	-
Coke and breeze transfer	9.55	4.49	-	-	-	-	-	-
Coke loadout	0.61	0.29	-	-	-	-	-	-
Cooling tower	15.2	15.2	-	-	-	-	-	-
Roads	40.4	6.01	-	-	-	-	-	-
TOTAL	543.3	397.6	3661.0	1365.5	374.2	48.46	40.26	0.3692

* Allowable PM10 emissions are based on Method 201 or 201A, filterable only. They do not include condensable Method 202.

14. In accordance with 25 PA Code, § 123.31, owner/operator shall not permit the emission of any malodorous air contaminants from any source in such a manner that the malodors, as determined by the Department, are detectable outside the owner/operator's property.

15. Emissions of Hazardous Air Pollutants (HAPs) from this facility shall not exceed 10 tons per 12 consecutive month period of any individual HAP, and 25 tons per 12 consecutive month period of all HAPs combined. (PA Code Title 25 § 127.12b)

16. The owner/operator shall attempt to meet a mercury emission rate from the main stack of 47 pounds per 12-month rolling average period by installing, operating, and maintaining a system for the injection of carbon into the waste gas exhaust stream at a rate not to exceed 2.0 pounds per million actual cubic feet of exhaust gas. (25 Pa. Code § 127.12b)

    A. The mercury emission rate from the main stack shall be tested during the initial performance test, and once each year thereafter. Records of carbon specifications, carbon injection rate, coal analysis, coke production rates,

and other available operating parameters shall be recorded during each stack test.

B. For the first 90 days of production, owner/operator shall test the mercury content of the coal used in the coke batteries once each week. Provided that the weekly testing can demonstrate that there is little variability (+/- 25%) in the mercury content of the coal feedstock, testing for mercury content of coal may be reduced to once each month. In every case, the mercury content of each new coal supply shall be tested.

C. Annual mercury emissions shall be monitored using a continuous emission monitoring system (CEMS) based on an EPA promulgated instrumental reference method for mercury. Alternatively, if the owner or operator demonstrates to the satisfaction of the Department that available CEMS are not reliable or do not accurately measure the mercury emissions from nonrecovery coke ovens, the annual mercury emissions shall be monitored using engineering calculations based on stack test data, coal analyses, and carbon injection rate records.

17. The owner/operator will secure Mitigation Reductions of SO2 emissions (TPY) in accordance with the following:

A. The Cambria Coke Company sources herein authorized to be constructed, shall not operate unless and until the Mitigation Reductions are secured.

B. The actual emission reductions that the Mitigation Reductions represent must have occurred and must be established in a Federally enforceable operating permit condition for the generating source(s) prior to operation of the Cambria Coke Company sources.

C. Cambria Coke Company shall demonstrate through modeling acceptable to DEP in consultation with the Federal Land Managers, that the net impact of the Cambria Coke Company and the Mitigation Reductions are below Class I thresholds used to determine the significance of the impacts with respect to the air quality related values (including visibility) in the Federal Class I areas prior to operation of the Cambria Coke Company sources. This modeling need only include the Cambria Coke Company sources and the source(s) generating the Mitigation Reductions.

D. For the purposes of this approval the Mitigation Reductions shall be surplus, permanent, quantified and Federally enforceable in accordance with 25 PA Code Section 127.207 (1).

E. For the purposes of this approval the Mitigation Reductions shall be calculated by establishing the baseline in accordance with 25 PA Code 127.207 (4).

F. For the purposes of this approval the Mitigation Reductions shall be generated by the techniques listed under 25 PA Code 127.207 (5).

G. Once the Mitigation Reductions are secured in accordance with this Plan Approval special condition they are no longer available for other uses (internal netting, sale, transfer or exchange for other purposes, ERC's, etc).

18. In accordance with 40 CFR § 60.252, owner/operator shall not cause to be discharged to the atmosphere from any coal processing and conveying equipment or coal storage system, gases which exhibit 20% opacity or greater.

19. In accordance with 40 CFR § 63.303(b)(2), for charging operations, the owner/operator shall install, operate, and maintain an emission control system consisting of a traveling hood with a fabric filter for the capture and collection of emissions from charging operations in a manner that is consistent with good air pollution control practices for minimizing emissions.

20. In accordance with 40 CFR § 63.303(d)(1), the owner/operator shall not discharge or cause to be discharged to the atmosphere from charging operations any fugitive emissions that exhibit an opacity greater than 20%, as determined by the procedures found at 40 CFR § 63.309(j).

21. In accordance with 40 CFR § 63.303(d)(3), the owner/operator shall not discharge or cause to be discharged to the atmosphere any emissions from a charging emission control device that exceed 10 percent opacity, as determined by the procedures in 40 CFR § 63.309(m).

22. In accordance with 40 CFR § 63.303(d)(2), the owner/operator shall not discharge or cause to be discharged to the atmosphere any emissions of particulate matter from a charging emission control device that exceed 0.0081 pounds per ton of dry coal charged, as determined by the procedures in 40 CFR § 63.309(k).

23. In accordance with 40 CFR § 63.303(b)(1), owner/operator shall not cause to be discharged to the atmosphere coke oven emissions that exceed 0.0% leaking oven doors, as determined by the procedures in 40 CFR § 63.309(d)(1), or owner/operator shall demonstrate that the coke ovens are operated under negative pressure.

24. During pushing operations, particulate matter emissions from the flat push hot car multiclone control device stacks shall not exceed 0.04 pounds per ton of coke. Visible particulate emissions from the flat push hot car vented to a multicyclone dust collector stack shall not exceed 20% opacity as a 6-minute average. (PA Code Title 25 § 127.12b)

25. In accordance with PA Code Title 25 § 123.42, the limitations of PA Code Title 25 § 123.41 shall not apply to a visible emission in any of the following instances:

    A. When the presence of uncombined water is the only reason for failure of the emission to meet the limitations.

    B. When the emission results from sources specified in PA Code Title 25 § 123.1(a)(1)-(9).

26. Each quench tower shall be constructed such that no more than 5 percent of the cross sectional area is uncovered or open to the sky. (PA Code Title 25 § 127.12b)

27. The total dissolved solids concentration of the quench water shall not exceed 1100 mg/liter. (PA Code Title 25 § 127.12b)

28. During initial startup, exhaust gases may be vented through the waste heat stacks until enough ovens are online to safely maintain spray dryer operation. The waste heat stacks shall not be used for more than 40 days after the date coke production commences on all batteries. (PA Code Title 25 § 127.12b)

TESTING

29. Compliance with short-term emission limitations shall be demonstrated through performance stack testing as follows. (PA Code Title 25 § 127.12b)

    A. Emissions of VOCs (Method 25A and 18), particulate matter (filterable Method 5) and PM10 (filterable Method 201 or 201A) in the exhaust from the charging machine fabric filter stacks.

    B. Emissions of particulate matter (filterable Method 5) and PM10 (filterable Method 201 or 201A and condensable Method 202), SO2, NOx, CO, VOCs (Method 25A and 18), H2SO4, Total HAPs, lead, and mercury (Method 29) in the exhaust from the main stack. Testing of condensable PM10 is for informational purposes only. Allowable emission PM10 limits are based on filterable Method 201 or 201A only.

    C. Emissions of particulate matter (filterable Method 5), PM10 (filterable Method 201 or 201A), and SO2 from one representative waste heat stack during HRSG venting. This test may take place during the first normally scheduled HRSG maintenance instead of during the first 180 days of operation.

D. Emissions of VOCs (Method 25A and 18), particulate matter (filterable Method 5) and PM10 (filterable Method 201 or 201A) in the exhaust from the pushing multicyclone stacks.

E. Emissions of particulate matter (filterable Method 5) and PM10 (filterable Method 201 or 201A) in the exhaust from the coke crushing/screening fabric filter stack.

F. All stack testing shall be performed in accordance with PA Code Title 25 Chapter 139 regulations and the most recent version of the Department's *Source Testing Manual.*

G. Two copies of the stack test protocol shall be submitted to the Department at least 60 days in advance of the stack test date. Stack testing shall not take place until owner/operator has received written approval of the stack test protocol.

H. Company shall notify the Department of the date and the time of the stack test at least two weeks prior to the tests so that an observer may be present.

I. Two copies of the stack test results shall be submitted to the Department within 60 days of completion of the test. If the test method requires that a laboratory analysis be performed, those stack test results shall be submitted to the Department within 90 days of completion of the test.

J. Stack testing shall be performed within 60 days of achieving maximum production rate but no later than 180 days after the initial startup. Unless specified elsewhere, stack testing shall be repeated once during each term of the Title V Operating Permit.

K. Owner/operator shall record all pertinent operating data during the stack tests and include this data with the stack test results. Pertinent data includes, but is not necessarily limited to: multicyclone fan motor amperes during each push sampled for each particulate matter test run, multicyclone pressure drop for each particulate matter test run during periods of pushing, all available production data, such as coal charging and coke production rates, carbon injection rate operating temperatures, pressure drops across all particulate matter control devices, measurements of pressures and temperatures in the common battery tunnel, HRSG inlet, etc.

30. In accordance with the methods described in 40 CFR § 63.309(j), owner/operator shall conduct a performance test once each week to demonstrate compliance with the opacity limit established in 40 CFR § 63.303(d)(1) for charging emissions.

31. The quench water shall be tested once each week for total dissolved solids. Take the quench water sample from a location that provides a representative sample of the quench water as applied to the coke (*e.g.*, from the header that feeds water to the quench tower reservoirs). Conduct sampling under normal and representative operating conditions. Determine the TDS concentration of the sample using Method 160.1 in 40 CFR § 136.3 (see "residue—filterable"), except that the total filterable residue must be dried at 103 to 105 °C (degrees Centigrade) instead of 180 °C. (PA Code Title 25 § 127.12b)

MONITORING

32. Owner/operator shall install, certify, maintain and operate a continuous emission monitoring system in accordance with 25 PA Code Chapter 139 and the Department's *Continuous Source Monitoring Manual*. At a minimum the systems shall measure and record the emission of the following on the main stack exhaust:

    Sulfur Dioxide emissions (as SO2).

33. Each waste heat stack shall be equipped with sufficient monitors and controls to indicate and record all periods of time that the waste heat stack is opened. (PA Code Title 25 § 127.12b)

34. In accordance with 40 CFR § 63.303(b)(1)(ii), the owner/operator shall monitor once per day for each day of operation, the pressure in the common battery tunnel to ensure that the ovens are operated under a negative pressure.

35. The common tunnel afterburner or HRSG inlet shall be equipped with sufficient temperature recording monitors to provide parametric indication of compliance with CO and VOC limits. (PA Code Title 25 § 127.12b)

36. In accordance with 40 CFR § 63.303(d)(3), the owner/operator shall observe the exhaust stack of each charging emissions control device at least once during each day of operation to determine if visible emissions are present during charging.

37. In accordance with 40 CFR § 63.303(d)(3)(iii), owner/operator shall conduct visible emission monitoring according to the procedures in 40 CFR § 63.309(m) within 24 hours after detecting any visible emissions from the charging emissions control device.

38. In accordance with 40 CFR 63.303(c)(1), owner/operator shall observe each oven door after charging and record the oven number of any door from which visible emissions occur. Emissions from coal spilled during charging or from material trapped within the seal area of the door are not considered to be a door leak if owner/operator demonstrates that the oven is under negative pressure, and that no emissions are visible form the top of the door or from dampers on the door.

39. For each multicyclone controlling the emissions from pushing operations, owner/operator shall monitor the multicyclone pressure drop during each push to ensure that it is within the range of plus or minus 2-6 inches of water column from the pressure drop level that was established during the initial performance test. (PA Code Title 25 § 127.12b)

40. At least once during each day of operation, owner/operator shall conduct a fugitive emission survey and a malodor survey around the developed perimeter of the facility property to ensure compliance with 25 Pa. Code §§ 123.1, 123.2, and 123.31. If any fugitive emissions or malodors are apparent, the permittee shall take immediate corrective action to eliminate them.

RECORDKEEPING

41. In accordance with 40 CFR § 63.303(b)(1)(ii), the owner/operator shall record once per day for each day of operation, the pressure in the common battery tunnel to ensure that the ovens are operated under a negative pressure.

42. In accordance with 40 CFR 63.303(c)(1), owner/operator shall record the oven number of any door from which visible emissions occur after charging.

43. Owner/operator shall keep records of corrective actions taken in accordance with 40 CFR 63.303(c)(2) to stop visible emissions from coke oven doors.

44. Owner/operator shall maintain a file of the design characteristics of the charging emission control system installed to comply with 40 CFR § 63.303(b)(2).

45. In accordance with 40 CFR § 63.303(d)(3), the owner/operator shall record the results of the observations taken of the exhaust stack of each charging emission control device at least once during each day of operation to determine if visible emissions are present, or the reason why the conditions did not permit a daily observation.

46. In accordance with 40 CFR § 63.303(d)(3)(ii), owner/operator shall record the cause of the problem creating the visible emission problem with the charging emission control device and the corrective action taken.

47. Owner/operator shall record the daily fan motor amperes at least once every eight hours during the operation of the electric motor used to ventilate the capture system applied to pushing operations to ensure that it is being operated within 20% or above the minimum level established during the initial performance test. (PA Code Title 25 § 127.12b)

48. For each multicyclone controlling the emissions from pushing operations, owner/operator shall record the multicyclone pressure drop during each push to ensure that it is within the range of plus or minus 2-6 inches of water column from the pressure drop level that was established during the initial performance test. (PA Code Title 25 § 127.12b)

49. Records shall be maintained of all testing done to demonstrate compliance with the 1100 mg/liter total dissolved solids limit for quench tower water. (PA Code Title 25 § 127.12b)

50. The permittee shall maintain a record of all fugitive emission and malodor surveys performed in accordance with Condition 40. The records shall include the date, time, name and title of the observer, whether fugitive emissions or malodors were observed, and any corrective action. Owner/operator shall keep records of all monitoring activities conducted as described above. The records shall be kept for five years, and shall be made available to the Department upon request. (PA Code Title 25 § 127.12b)

51. Owner/operator must maintain a log detailing the operation and maintenance of the process and emission control equipment. (PA Code Title 25 § 127.12b)

REPORTING

52. The permittee shall report each malfunction that may result in an emissions increase to the Department. For purposes of this condition, a malfunction is defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control or process equipment; or, operating in a non-permitted manner. When the malfunction poses an imminent and substantial danger to the public's health and safety, or potential harm to the environment, the permittee shall report the incident to the Department within one hour. (PA Code Title 25 § 127.12b)

    A. The report shall describe the:

        i) name and location of the facility;

        ii) nature and cause of the malfunction;

        iii) time when the malfunction was first observed;

        iv) expected duration of excess emissions; and

        v) estimated rate of emissions.

    B. The owner/operator shall notify the Department immediately when corrective measures have been accomplished.

C. Unless otherwise required by specific reporting requirements, any malfunction that is not subject to the notice requirements above, shall be reported to the Department within 24 hours (or the next business day) by telephone, and within five days by mail of discovery. The report shall contain the same information required by subsection (A).

D. Malfunctions shall be reported to the Department at the following address:

PADEP
Office of Air Quality
400 Waterfront Drive
Pittsburgh, PA 15222-4745

(412) 442-4000

53. In accordance with PA Code Title 25 §§ 135.3 and 135.21, the owner/operator shall submit by March 1 of each year, a source report for the preceding calendar year. The report shall include information for all previously reported sources, new sources which were first operated during the proceeding calendar year and sources modified during the same period which were not previously reported. A source owner/operator may request an extension of time from the Department for the filing of a source report, and the Department may grant the extension for reasonable cause.

54. The coal processing equipment and coal storage system is subject to the applicable requirements of 40 CFR 60, Subpart Y, Standards of Performance for Coal Preparation Plants.

55. The coke oven batteries are subject to the applicable requirements for nonrecovery coke oven batteriesof 40 CFR 63, Subpart L – National Emission Standards for Coke Oven Batteries.

56. In accordance with 40 CFR §§ 60.4 and 63.9, copies of all requests, reports, applications, submittals and other communications shall be forwarded to both the Environmental Protection Agency and the Pennsylvania Department of Environmental Protection at the addresses shown below, unless otherwise noted:

Director, Air, Toxics, and Radiation Protection
Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103

PA Department of Environmental

Regional Air Quality Manager
Office of Air Quality
400 Waterfront Drive
Pittsburgh, PA 15222-4745

57. Owner/operator shall comply with the applicable reporting requirements of 40 CFR § 60.7, 40 CFR § 63.9 and 40 CFR § 63.311.

58. Owner/operator shall comply with the startup, shutdown and malfunction reporting requirements found in 40 CFR § 63.310(b).

59. Owner/operator shall report any instances of positive pressure in the battery common tunnel in accordance with 40 CFR § 63.303(b)(1)(ii).

WORK PRACTICE STANDARDS

60. A person responsible for any source specified in subsections 123.1(a)(1) -- (6) or (8) shall take all reasonable actions to prevent particulate matter from becoming airborne. These actions shall include, but not be limited to, the following:

    A. Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads, or the clearing of land.

    B. Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles and other surfaces which may give rise to airborne dusts.

    C. Paving and maintenance of roadways.

    D. Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

61. Owner/operator shall prepare, and operate in accordance with, a work practice plan that meets all of the requirements for nonrecovery coke oven batteries found in 40 CFR § 63.306(b).

62. In accordance with 40 CFR § 63.310(a), owner/operator shall operate and maintain the coke oven battery and its pollution control equipment in a manner consistent with good air pollution control practices.

63. In accordance with 40 CFR § 63.310(b), owner/operator shall develop and implement a written start-up, shutdown and malfunction plan.

64. Owner/operator shall take corrective action to eliminate the presence of visible emissions from a charging emissions control device in accordance with 40 CFR § 63.303(d)(3)(i).

65. In accordance with 40 CFR § 63.303(d)(4), owner/operator shall develop and implement written procedures for adjusting the oven uptake damper to maximize oven draft during charging and for monitoring the oven damper setting during each charge to ensure that the damper is fully open.

66. Except as provided by 40 CFR § 63.303(c)(2)(i) and (ii), owner/operator shall take corrective action to stop visible emissions from coke oven doors within 15 minutes in accordance with 40 CFR § 63.303(c)(2).

67. Owner/operator shall visually inspect each oven prior to pushing by opening the door damper and observing the bed of coke. (PA Code Title 25 § 127.12b)

68. No coke oven shall be pushed unless the visual inspection indicates that there is no smoke in the open space above the coke bed and that there is an unobstructed view of the door on the opposite side of the oven. (PA Code Title 25 § 127.12b)

69. Owner/operator shall maintain the daily fan motor amperes of each electric motor used to ventilate the capture system applied to pushing operations within 20% of or above the minimum level established during the initial performance test. (PA Code Title 25 § 127.12b)

70. Owner/operator shall prepare and operate at all times according to a written operation and maintenance plan for each capture system and control device applied to pushing emissions. Each plan must address at a minimum the following elements: (PA Code Title 25 § 127.12b)

    A. Monthly inspections of the equipment that are important to the performance of the total pushing capture system (*e.g.*, pressure sensors, dampers, and damper switches). This inspection must include observations of the physical appearance of the equipment (*e.g.*, presence of holes in ductwork or hoods, flow constrictions caused by dents or accumulated dust in ductwork, and fan erosion). In the event a defect or deficiency is found in the capture system (during a monthly inspection or between inspections), owner/operator shall complete repairs within 30 days after the date that the defect or deficiency is discovered except as specified below.

    B. If it is determined that the repairs cannot be comleted within 30 days but can be completed within 60 days, owner/operator must submit a written notice that must be received by the permitting authority within 30 days after the date that the defect or deficiency is discovered. The notice must contain a description of the defect or deficiency, the steps needed and taken to correct the problem, the interim steps being taken to mitigate the emissions impact of the defect or deficiency, and an explanation of why the repairs cannot be completed within 30 days. Owner/operator must then

complete the repairs within 60 days after the date that the defect or deficiency is discovered.

C. In those rare instances when repairs cannot be completed within 60 days, owner/operator shall submit a written request for extension of time to complete the repairs. The request must be received by the permitting authority not more than 45 days after the date that the defect or deficiency is discovered. The request must contain all of the information required for the written notice described in paragraph B of this section, along with a detailed proposed schedule for completing the repairs and a request for approval of the proposed repair schedule. The permitting authority may consider all relevant factors in deciding whether to approve or deny the request (including feasibility and safety). Each approved schedule must provide for completion of repairs as expeditiously as practicable, and the permitting authority may request modifications to the proposed schedule as part of the approval process.

D. Preventative maintenance for each pushing control device, including a preventative maintenance schedule that is consistent with the manufacturer's instructions for routine and long-term maintenance.

71. Owner/operator must wash the baffles in each quench tower once each day that the tower is used to quench coke, except as specified below: (PA Code Title 25 § 127.12b)

A. Owner/operator is not required to wash the baffles in a quench tower if the highest measured ambient temperature remains less than 30 degrees Fahrenheit throughout that day (24-hour period). If the measured ambient temperature rises to 30 degrees Fahrenheit or more during the day, owner/operator must resume daily washing according to the schedule in your operation and maintenance plan.

B. Owner/operator must continuously record the ambient temperature on days that the baffles were not washed.

72. Owner/operator must inspect each quench tower monthly for damaged or missing baffles and blockage. (PA Code Title 25 § 127.12b)

73. Owner/operator must initiate repair or replacement of damaged or missing baffles within 30 days and complete as soon as practicable. (PA Code Title 25 § 127.12b)

ADDITIONAL REQUIREMENTS

74. The proposed construction is subject to PA Code Title 25 §§ 127.206(d)(1) and (2), and other applicable sections of Chapter 127, Subchapter E, for non-attainment New Source Review. In accordance with PA Code Title 25 § 127.205(4), each new facility shall offset the potential to emit of that facility in accordance with PA Code Title 25 §§ 127.210.

75. The potential to emit from this new facility is established at 1366 tons of NOx per year and in accordance with PA Code Title 25 § 127.210 will be offset with Emission Reduction Credits (ERCs) at a ratio of 1.15:1.0, or 1571 tons of NOx ERCs.

76. Prior to commencement of operation, owner/operator shall secure a total of 1571 tons of NOx ERCs that have been properly generated, certified through the Department, and processed through the ERC Registry in accordance with PA Code Title 25 § 127.206(d)(1). Upon transfer, owner/operator shall provide the Department with documentation clearly specifying the details of the ERC transaction.

77. Per PA Code Title 25 § 127.13, if the construction is not commenced within 18 months of issuance of this Plan Approval, or if there is more than an 18-month lapse in construction, a new Plan Approval application shall be submitted.

78. Owner/operator shall submit a Title V Operating Permit Application within 120 days of startup of the source(s) and/or pollution control device(s). (PA Code Title 25 § 127.505(a))

79. The Title V Operating Permit application shall include a CAM submittal prepared in accordance with 40 CFR § 64.4 for applicable units.

80. This Plan Approval authorizes the temporary operation of the source(s) covered by this Plan Approval provided that the following conditions are met: (PA Code Title 25 § 127.12b(d))

    A. The Department must receive written notice from the owner/operator of the anticipated date that source(s) will commence operation.

    B. Operation is authorized only to facilitate the startup and shakedown of the source(s), to permit operation of the source(s) pending the issuance of an Operating Permit, or to permit the evaluation of the source(s) for compliance with all applicable regulations and requirements.

    C. This condition authorizes temporary operation of the source(s) for a period of 180 days from the start of commencement of operation, provided that the Department receives notice from the owner/operator pursuant to Subpart (A), above.

D. Owner/operator may request an extension of this Plan Approval if compliance with all applicable regulations and Plan Approval requirements has not been established. The extension request shall be submitted in writing at least 15 days prior to the end of this period of temporary operation and shall provide a description of the compliance status of the source, a detailed schedule for establishing compliance, and the reasons that compliance has not been established.

E. The notice submitted by the owner/operator pursuant to Subpart (A), above, prior to the expiration date of this Plan Approval, shall modify the Plan Approval expiration date. The new Plan Approval expiration date shall be 180 days from the date of the start-up.